Advantys STB
Standard CANopen Devices

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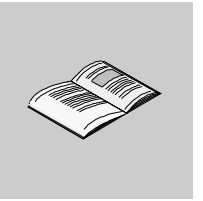

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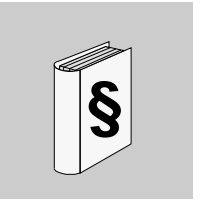
Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

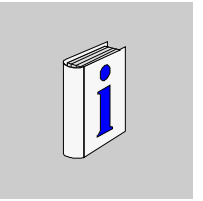
⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

CAUTION
CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

About the Book



At a Glance

Document Scope

This document describes the functions and parameters of some of the enhanced CANopen devices that may be used in an Advantys STB island. The features are described only from the island's point of view — how the devices may be configured as nodes on the island bus. For detailed information on the full capabilities of the devices, you should refer to the manufacturer's user documentation.

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Title of Documentation	Reference Number
Advantys STB System Planning and Installation Guide	890 USE 171 0x
Advantys STB Analog I/O Modules Reference Guide	31007715 (E), 31007716 (F), 31007717 (G), 31007718 (S), 31007719 (I)
Advantys STB Discrete I/O Modules Reference Guide	31007720 (E), 31007721 (F), 31007722 (G), 31007723 (S), 31007724 (I)

Advantys STB Counter Modules Reference Guide	31007725 (E), 31007726 (F), 31007727 (G), 31007728 (S), 31007729 (I)
Advantys STB Special Modules Reference Guide	31007730 (E), 31007731 (F), 31007732 (G), 31007733 (S), 31007734 (I)

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Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this product related warning can result in injury or equipment damage.

User Comments

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Festo CPV-CO2 Valve Terminal with Direct Connection

1

Overview

The Festo CPV-CO2 module is a compact performance valve terminal with a direct fieldbus connection (CPV Direct). The module can be used as an enhanced CANopen device in an Advantys STB island configuration. This implementation uses the direct CANopen connection on the CPV terminal to communicate across the Advantys STB island bus, allowing the valve terminal to become a node on the island. You can use any Advantys STB NIM to control the CP system, allowing it to function on any of the open fieldbuses supported by Advantys STB.

CPV Direct consists of a maximum of 16 valves and may be extended with a maximum of:

- 1 CP input module
- 1 CP output module or valve terminal

The Advantys configuration software lists 2 Festo entries in its Catalog Browser:

- Select *CPV-CO2 (No Inputs)* if you want to configure the CPV Direct connection without extensions or with one extension to a CP output module or valve terminal.
- Select *CPV-CO2 (With Inputs)* if you want to configure the CPV Direct connection with extensions to a CP input module (and optionally to a CP output module or valve terminal).

What's in this Chapter?

This chapter contains the following sections:

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1.2	Festo CPV-CO2 (With Inputs) Compact Performance Valve	18

1.1 Festo CPV-CO2 (No Inputs) Compact Performance Valve

Overview

When you select a *CPV-CO2 (No Inputs)* module from the Advantys STB Catalog Browser, you select a Festo CPV-CO2 valve that may be configured with:

- a single CPV Direct connection extended with a CP output module
- a single CPV Direct connection extended by 1 CP valve terminal
- CPV Direct with no extension

What's in this Section?

This section contains the following topics:

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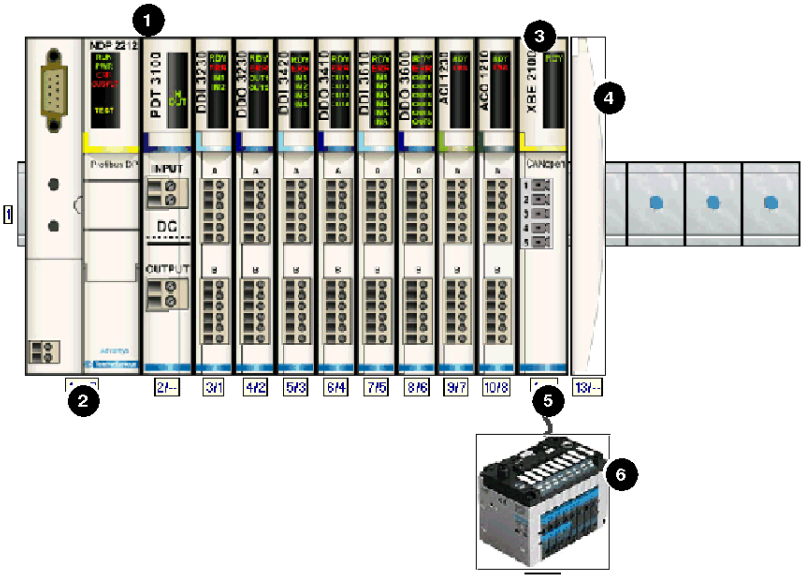
Festo CPV-CO2 (No Input) Valve Overview	13
Festo CPV-CO2 (No Inputs) Functional Description	15
Festo CPV-CO2 (No Inputs) Process Image	16

Festo CPV-CO2 (No Input) Valve Overview

Overview

When you select a *CPV-CO2 (No Inputs)* module from the Catalog Browser, it appears in the Island Editor at the end of the island bus.



1 Advantys STB primary segment
2 NIM
3 STB XBE 2100 CANopen extension module
4 STB XMP 1100 termination plate
5 user-supplied CANopen extension cable
6 Festo CPV-CO2 (No Input) valve terminal

Setting Module Parameters for the Island Bus

The CPV-CO2 module has 2 dual in-line (DIL) switches, a 4-element switch and an 8-element switch. These switches are used to define the baud rate, set up any extension to the CP system, and set the station number (or node ID) of the device on the STB island bus. The switch set-up procedure is defined in the Festo manual. The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Remove the switch module from the CPV-CO2 module.	
3	On the 4-element DIL switch, set switch 1 off and switch 2 on.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
4	Use switches 3 and 4 on the 4-element DIL switch to define how the module will extend to the CP system.	If you want to use CPV Direct with an extension to a valve terminal or to a CP output module, set switch 3 to off and switch 4 to on. If you do not want to use any extensions, set both switch 3 and switch 4 off.
5	Use the 8-element DIL switch to set the node ID in BCD.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Festo CPV-CO2 (No Inputs) Functional Description

Overview

When you open the *CPV-CO2 (No Inputs)* module in the Module Editor in the Advantys configuration software, you may define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output.

Output Error Modes

When communications are lost between the module and the fieldbus master, the module's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Festo CPV-CO2 (No Inputs) Process Image

Output Data

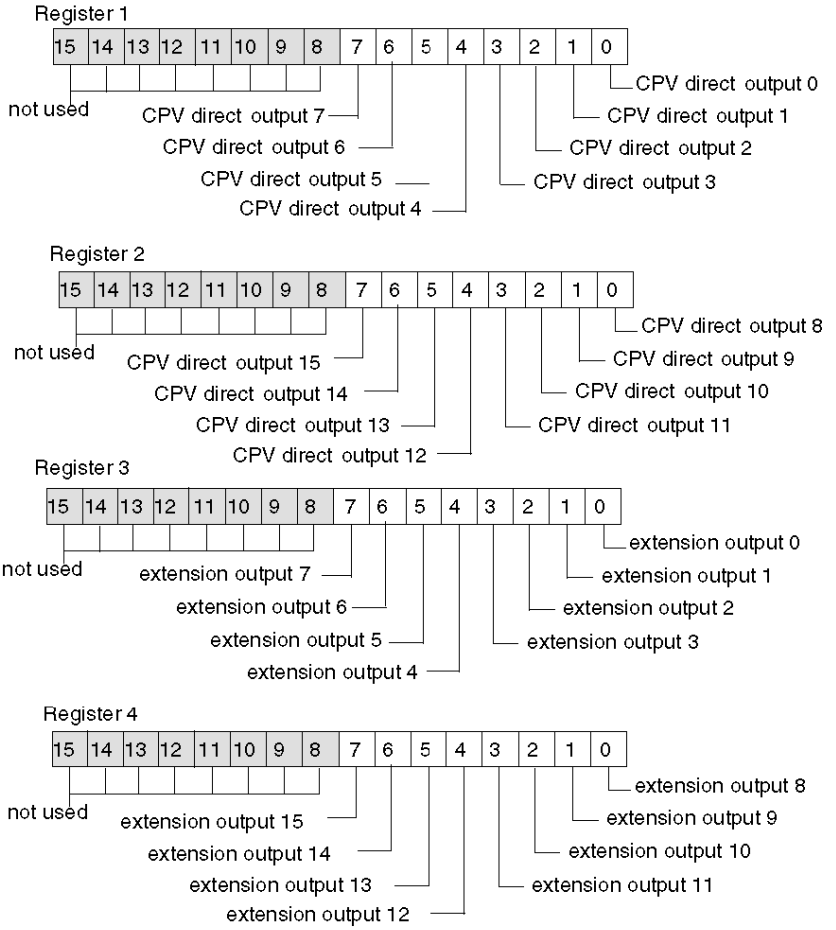
The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by an HMI panel connected to the NIM's CFG port. The *Festo CPV-CO2 (No Inputs)* uses 4 registers in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The *Festo CPV-CO2 (No Inputs)* uses 4 contiguous registers in the output data block. Their specific position in the process image is based on the module's node address on the island bus.

The fieldbus master always sends 4 registers of output data to the Advantys STB NIM for the *Festo CPV-CO2 (No Inputs)* valve. When the CPV Direct connection is configured to operate without extensions, it uses only the first 2 registers. When the CPV Direct connection is extended with a CP output module or valve terminal, it uses all 4 registers.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Process Image


Register 1
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
CPV direct output 7
CPV direct output 6
CPV direct output 5
CPV direct output 4
CPV direct output 3
CPV direct output 2
CPV direct output 1
CPV direct output 0
Register 2
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
CPV direct output 15
CPV direct output 14
CPV direct output 13
CPV direct output 12
CPV direct output 11
CPV direct output 10
CPV direct output 9
CPV direct output 8
Register 3
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension output 7
extension output 6
extension output 5
extension output 4
extension output 3
extension output 2
extension output 1
extension output 0
Register 4
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension output 15
extension output 14
extension output 13
extension output 12
extension output 11
extension output 10
extension output 9
extension output 8

NOTE: When the CPV Direct connection is configured to operate without extensions, only registers 1 and 2 are used.

1.2 Festo CPV-CO2 (With Inputs) Compact Performance Valve

Overview

When you select a *CPV-CO2 (With Inputs)* module from the Advantys STB Catalog Browser, you select a Festo CPV-CO2 valve that may be configured with:

- a single CPV Direct connection extended with 1 CP input module
- a CPV Direct connection extended by 1 CP input module along with a CP output module or valve terminal

What's in this Section?

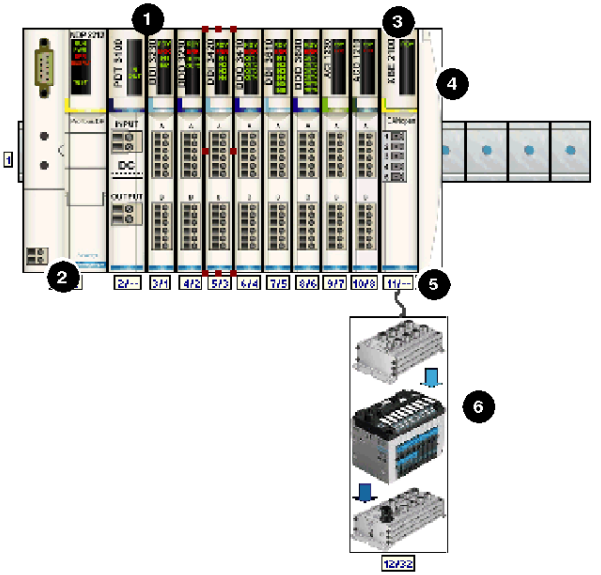
This section contains the following topics:

Topic	Page
Festo CPV-CO2 (With Inputs) Valve Overview	19
Festo CPV-CO2 (With Inputs) Functional Description	21
Festo CPV-CO2 (With Inputs) Process Image	22

Festo CPV-CO2 (With Inputs) Valve Overview

Overview

When you select a *CPV-CO2 (With Inputs)* module from the Advantys STB Catalog Browser, it appears in the Island Editor at the end of the island bus.



1 Advantys STB primary segment
2 NIM
3 STB XBE 2100 CANopen extension module
4 STB XMP 1100 termination plate
5 user-supplied CANopen extension cable
6 Festo CPV-CO2 (With Inputs) module

Setting Module Parameters for the Island Bus

The CPV-CO2 module has 2 dual in-line (DIL) switches, a 4-element switch, and an 8-element switch. These switches are used to define the baud rate, set up any extension to the CP system, and set the station number (or node ID) of the device on the STB island bus. The switch set-up procedure is defined in the Festo manual. The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Remove the switch module from the CPV-CO2 module.	
3	On the 4-element DIL switch, set switch 1 off and switch 2 on.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
4	Use switches 3 and 4 on the 4-element DIL switch to define how the module will extend the CP system.	If you want to use CPV Direct with an extension to a CP input module only, set switch 3 to on and switch 4 to off. If you want to use CPV Direct with an extension to a CP input module followed by a CPV terminal or CP output module, set both switch 3 and switch 4 on.
5	Use the 8-element DIL switch to set the node ID in BCD.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Festo CPV-CO2 (With Inputs) Functional Description

Overview

When you open the *CPV-CO2 (With Inputs)* module in the Module Editor in the Advantys configuration software, you may define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output.

Output Error Modes

When communications are lost between the module and the fieldbus master, the module's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Festo CPV-CO2 (With Inputs) Process Image

Output Data

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by an HMI panel connected to the NIM's CFG port. The *Festo CPV-CO2 (With Inputs)* uses 4 registers in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The *Festo CPV-CO2 (With Inputs)* uses 4 contiguous registers in the output data block. Their specific position in the process image is based on the module's node address on the island bus.

The fieldbus master always sends 4 registers of output data to the Advantys STB NIM for the *Festo CPV-CO2 (With Inputs)* valve. When the valve is extended with a CP input module only, it uses only the first 2 registers of output data. When the valve is extended with a CP output module or valve terminal or to a CP output module in addition to the CP input module, it uses all 4 registers.

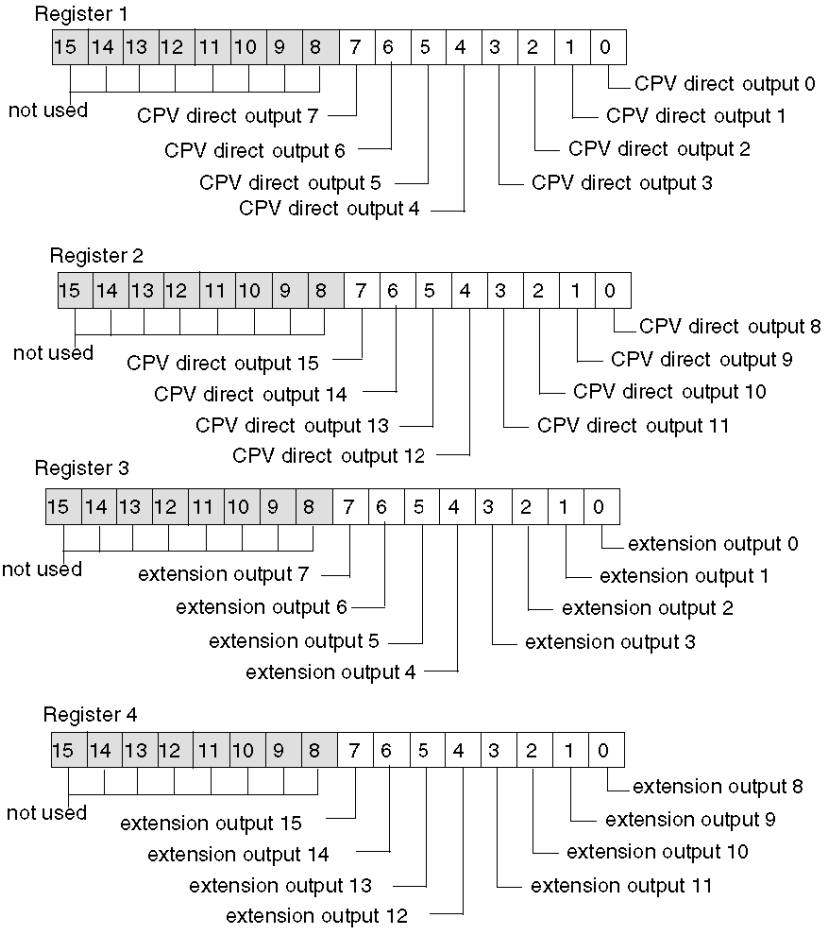
Input Data

The *Festo CPV-CO2 (With Inputs)* sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in two 16-bit registers. This information can be read by the fieldbus master or an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The module is represented by 2 contiguous registers in this block. The specific registers used are determined by the module's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

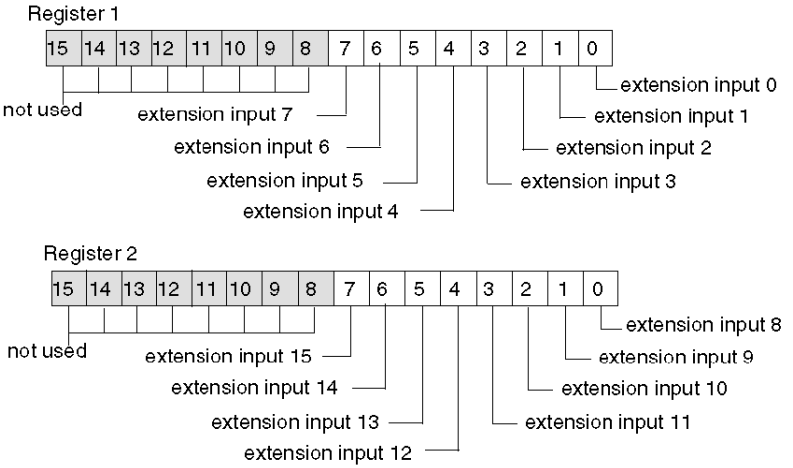
Output Process Image


Register 1
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
CPV direct output 7
CPV direct output 6
CPV direct output 5
CPV direct output 4
CPV direct output 3
CPV direct output 2
CPV direct output 1
CPV direct output 0
Register 2
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
CPV direct output 15
CPV direct output 14
CPV direct output 13
CPV direct output 12
CPV direct output 11
CPV direct output 10
CPV direct output 9
CPV direct output 8
Register 3
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension output 7
extension output 6
extension output 5
extension output 4
extension output 3
extension output 2
extension output 1
extension output 0
Register 4
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension output 15
extension output 14
extension output 13
extension output 12
extension output 11
extension output 10
extension output 9
extension output 8

NOTE: When the valve is configured to extend only to a CP input module, registers 1 and 2 of the output process image are used. When the valve is configured to extend beyond the CP input module to a CPV terminal or a CP output module, all 4 registers are used.

Input Process Image

The *Festo CPV-CO2 (With Inputs)* valve always sends 2 registers of input process image across the island bus to the NIM.


Register 1
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension input 7
extension input 6
extension input 5
extension input 4
extension input 3
extension input 2
extension input 1
extension input 0
Register 2
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
extension input 15
extension input 14
extension input 13
extension input 12
extension input 11
extension input 10
extension input 9
extension input 8

Advantys FTB IP67 Protected Devices

2

Overview

Advantys FTB devices are IP67 protected monoblock I/O splitter boxes. FTB devices with CANopen fieldbus interfaces may be used as enhanced CANopen devices in an Advantys STB island configuration. This implementation uses the direct CANopen connection on an FTB monoblock, allowing the device to become a node on the island.

These Advantys FTB devices enhance the mechatronics of an island bus by bringing the I/O connections out of the NEMA cabinet that encloses standard STB segments. You can position your I/O closer to the sensors and actuators they control, even in harsh operating environments.

You can use any Advantys STB NIM to control the FTB devices, allowing them to function on any of the open fieldbuses supported by Advantys STB.

What's in this Chapter?

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2.1 Advantys FTB 1CN16EP0 Splitter Box

Overview

When you select an Advantys FTB 1CN16EP0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel splitter box. By default, this box supports 8 sensor inputs with integrated diagnostics. You may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs. Overall, this box supports up to 16 sensor inputs.

What's in this Section?

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Advantys FTB 1CN16EP0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN16EP0 device, encased in plastic, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN16EP0 Functional Description

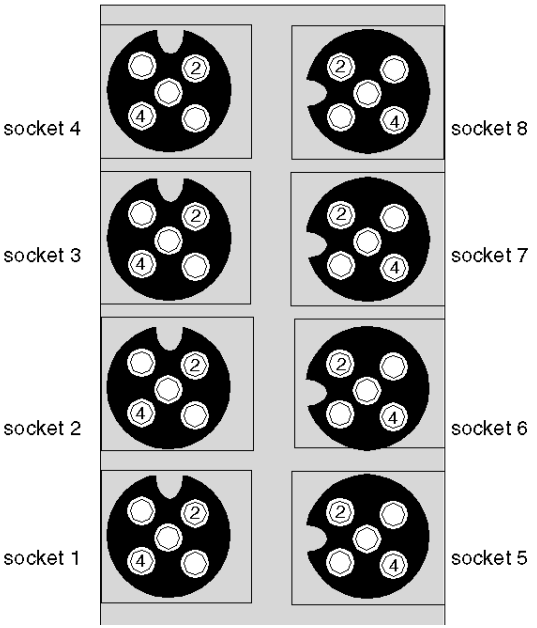
Overview

When you open the FTB 1CN16EP0 splitter box in the Module Editor in the Advantys configuration software, you may configure pin 2 on each socket to report either sensor diagnostics or the states of 8 additional inputs. You may also set an input filtering constant for each sensor input.

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated sensor (1 through 8).

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated input channel to report the state of additional sensor (in the range 9 through 16). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated sensor (1 through 8).



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	N/A
	2	diagnostic for sensor 1	state of sensor 9
2	4	state of sensor 2	N/A
	2	diagnostic for sensor 2	state of sensor 10
3	4	state of sensor 3	N/A
	2	diagnostic for sensor 3	state of sensor 11
4	4	state of sensor 4	N/A
	2	diagnostic for sensor 4	state of sensor 12
5	4	state of sensor 5	N/A
	2	diagnostic for sensor 5	state of sensor 13
6	4	state of sensor 6	N/A
	2	diagnostic for sensor 6	state of sensor 14
7	4	state of sensor 7	N/A
	2	diagnostic for sensor 7	state of sensor 15
8	4	state of sensor 8	N/A
	2	diagnostic for sensor 8	state of sensor 16

The pin 2 data is reported in the second input word dedicated to the FTB 1CN16EP0 splitter box in the input process image *(see page 30)*.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. Optionally, you may set the value to 1, which causes the particular input to be ignored.

The Module Editor provides 16 editable channels. It allows you to set the filter for the 8 standard sensors when the Input/Diagnostic parameters are set to a value of 1 and for any additional sensors (up to 8 more sensors) when Input/Diagnostic parameters for those channels are set to 0.

Advantys FTB 1CN16EP0 Process Image

Input Data

The FTB 1CN16EP0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in four 16-bit registers. This information can be read by the fieldbus master or an HMI panel connected to the NIM's CFG port.

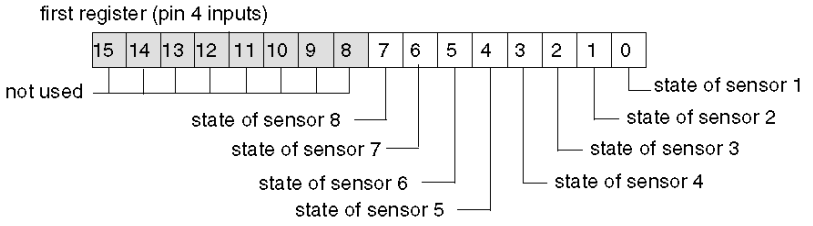
The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 4 contiguous registers in this block—the data registers followed by the diagnostic registers. The specific registers used are determined by the splitter box's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

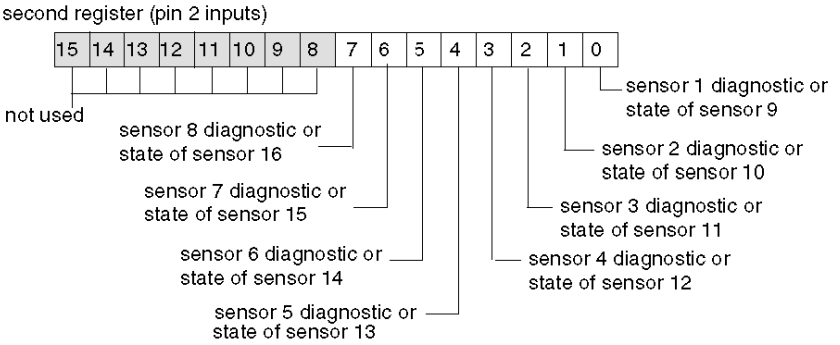
Input/Diagnostic Registers

The FTB 1CN16EP0 provides 8 sensor inputs with integrated diagnostics. Each of the 8 M12 round sockets on the splitter box supports an input (via pin 4) and its associated diagnostic (via pin 2). Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support an additional sensor input.

Pin 4 data is reported in the first of the four input process image registers used by the FTB 1CN16EP0 splitter box.



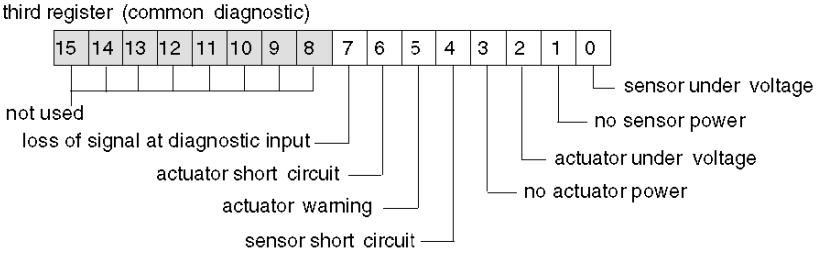
By default, pin 2 on each socket is configured to report diagnostics for the associated sensor input. You may configure the settings on any of the channels so that pin 2 supports an input by changing the Input/Diagnostic parameter *(see page 28)* in the Advantys configuration software. The second input process image register reports the information sent via pin 2 as follows.


second register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
sensor 8 diagnostic or state of sensor 16
sensor 7 diagnostic or state of sensor 15
sensor 6 diagnostic or state of sensor 14
sensor 5 diagnostic or state of sensor 13
sensor 4 diagnostic or state of sensor 12
sensor 3 diagnostic or state of sensor 11
sensor 2 diagnostic or state of sensor 10
sensor 1 diagnostic or state of sensor 9

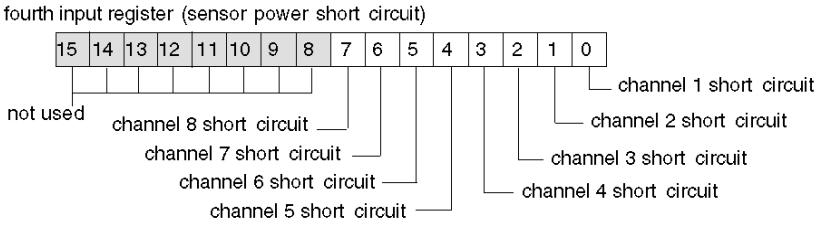
When pin 2 on any channel is configured for diagnostics, its associated bit value in the second register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third register (common diagnostic)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator short circuit
actuator warning
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

2.2 Advantys FTB 1CN16EM0 Splitter Box

Overview

When you select an Advantys FTB 1CN16EM0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel splitter box. By default, this box supports 8 sensor inputs with integrated diagnostics. You may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs. Overall, this box supports up to 16 sensor inputs.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN16EM0 Functional Description	35
Advantys FTB 1CN16EM0 Process Image	37

Advantys FTB 1CN16EM0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN16EM0 device, encased in metal, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN16EM0 Functional Description

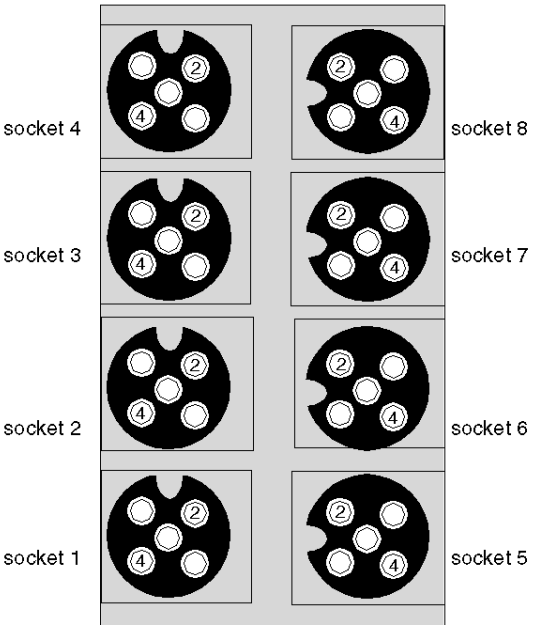
Overview

When you open the FTB 1CN16EM0 splitter box in the Module Editor in the Advantys configuration software, you may configure pin 2 on each socket to report either sensor diagnostics or the states of 8 additional inputs. You may also set an input filtering constant for each sensor input.

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated sensor (1 through 8).

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated input channel to report the state of additional sensor (in the range 9 through 16). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated sensor (1 through 8).



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	N/A
	2	diagnostic for sensor 1	state of sensor 9
2	4	state of sensor 2	N/A
	2	diagnostic for sensor 2	state of sensor 10
3	4	state of sensor 3	N/A
	2	diagnostic for sensor 3	state of sensor 11
4	4	state of sensor 4	N/A
	2	diagnostic for sensor 4	state of sensor 12
5	4	state of sensor 5	N/A
	2	diagnostic for sensor 5	state of sensor 13
6	4	state of sensor 6	N/A
	2	diagnostic for sensor 6	state of sensor 14
7	4	state of sensor 7	N/A
	2	diagnostic for sensor 7	state of sensor 15
8	4	state of sensor 8	N/A
	2	diagnostic for sensor 8	state of sensor 16

The pin 2 data is reported in the second input word dedicated to the FTB 1CN16EM0 splitter box in the input process image *(see page 37)*.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. Optionally, you may set the value to 1, which causes the particular input to be ignored.

The Module Editor provides 16 editable channels. It allows you to set the filter for the 8 standard sensors when the Input/Diagnostic parameters are set to a value of 1 and for any additional sensors (up to 8 more sensors) when Input/Diagnostic parameters for those channels are set to 0.

Advantys FTB 1CN16EM0 Process Image

Input Data

The FTB 1CN16EM0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in four 16-bit registers. This information can be read by the fieldbus master or by an HMI panel connected to the NIM's CFG port.

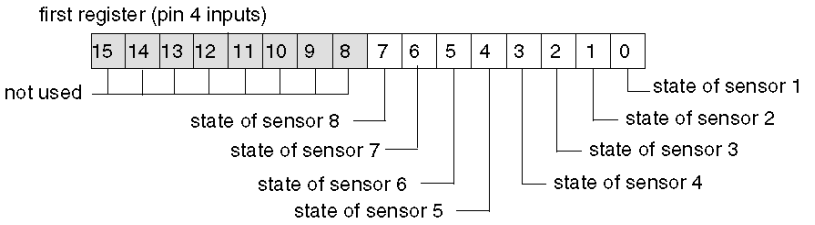
The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 4 contiguous registers in this block—the data registers followed by the diagnostic registers. The specific registers used are determined by the splitter box's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

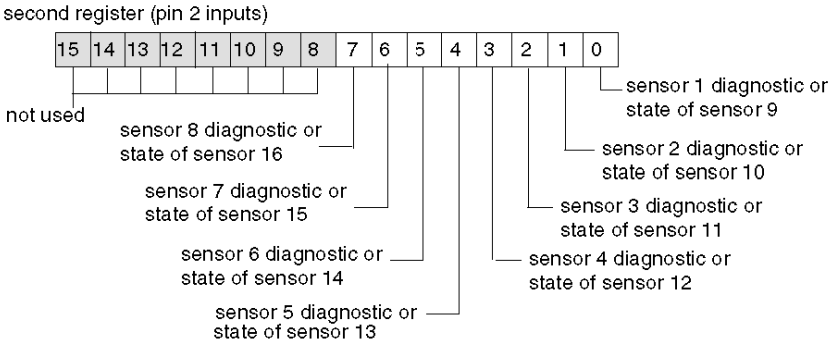
Input/Diagnostic Registers

The FTB 1CN16EM0 provides 8 sensor inputs with integrated diagnostics. Each of the 8 M12 round sockets on the splitter box supports an input (via pin 4) and its associated diagnostic (via pin 2). Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support an additional sensor input.

Pin 4 data is reported in the first of the 4 input process image registers used by the FTB 1CN16EM0 splitter box.


first register (pin 4 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of sensor 8
state of sensor 7
state of sensor 6
state of sensor 5
state of sensor 4
state of sensor 3
state of sensor 2
state of sensor 1

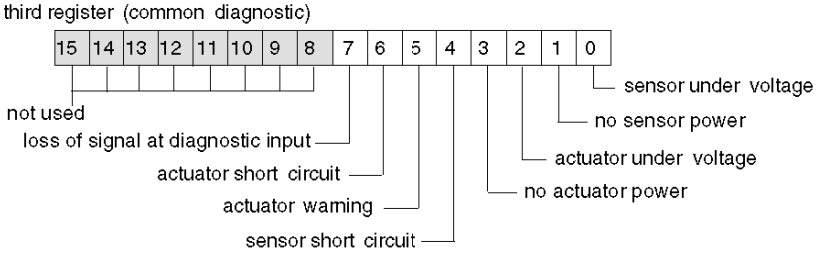
By default, pin 2 on each socket is configured to report diagnostics for the associated sensor input. You may configure the settings on any of the channels so that pin 2 supports an input by changing the Input/Diagnostic parameter *(see page 35)* in the Advantys configuration software. The second input process image register reports the information sent via pin 2 as follows.


second register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
sensor 8 diagnostic or state of sensor 16
sensor 7 diagnostic or state of sensor 15
sensor 6 diagnostic or state of sensor 14
sensor 5 diagnostic or state of sensor 13
sensor 4 diagnostic or state of sensor 12
sensor 3 diagnostic or state of sensor 11
sensor 2 diagnostic or state of sensor 10
sensor 1 diagnostic or state of sensor 9

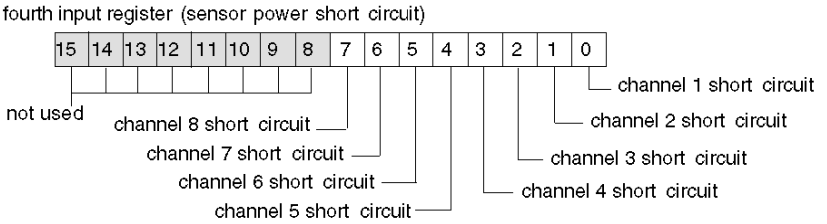
When pin 2 on any channel is configured for diagnostics, its associated bit value in the second register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third register (common diagnostic)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator short circuit
actuator warning
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

2.3 Advantys FTB 1CN08E08SP0 Splitter Box

Overview

When you select an Advantys FTB 1CN08E08SP0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel splitter box. By default, this box supports 8 actuator outputs with integrated diagnostics. You may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs. Overall, this box supports a combination of 8 actuator outputs and up to 8 sensor inputs.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN08E08SP0 Functional Description	42
Advantys FTB 1CN08E08SP0 Process Image	46

Advantys FTB 1CN08E08SP0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN08E08SP0 device, encased in plastic, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN08E08SP0 Functional Description

Overview

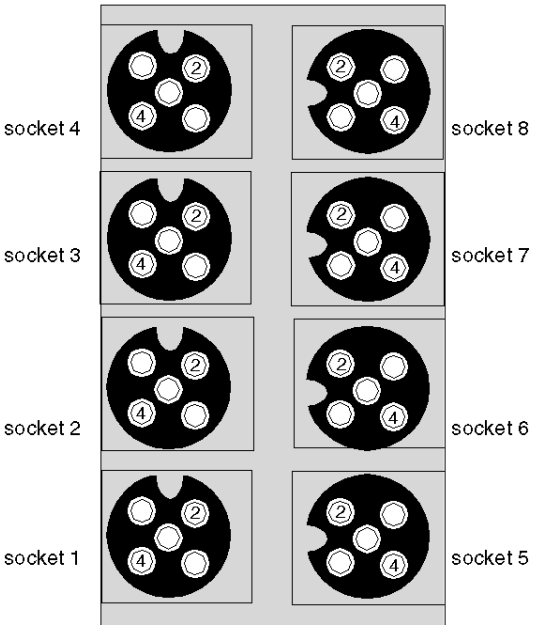
When you open the FTB 1CN08E08SP0 splitter box in the Module Editor in the Advantys configuration software, you may:

- configure pin 2 on each socket to report either actuator diagnostics or the states of 8 sensor inputs
- set filtering constant for each actuator output and configured sensor input
- define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated actuator (1 through 8).

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated channel to report the state of a sensor (in the range 1 through 8). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated actuator.



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of actuator 1	N/A
	2	diagnostic for actuator 1	state of sensor 1
2	4	state of actuator 2	N/A
	2	diagnostic for actuator 2	state of sensor 2
3	4	state of actuator 3	N/A
	2	diagnostic for actuator 3	state of sensor 3
4	4	state of actuator 4	N/A
	2	diagnostic for actuator 4	state of sensor 4
5	4	state of actuator 5	N/A
	2	diagnostic for actuator 5	state of sensor 5
6	4	state of actuator 6	N/A
	2	diagnostic for actuator 6	state of sensor 6
7	4	state of actuator 7	N/A
	2	diagnostic for actuator 7	state of sensor 7
8	4	state of actuator 8	N/A
	2	diagnostic for actuator 8	state of sensor 8

The pin 2 data is reported in the first input register dedicated to the FTB 1CN08E08SP0 splitter box in the input process image *(see page 47)*.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. If you configure a channel's bit value to 1, any input that might be received on that channel is ignored. The filter constant may also be used to disable/enable channels that are configured for diagnostics.

Output Error Modes

When communications are lost between the splitter box and the fieldbus master, the box's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Output Filter Constant

By default, the Output Filter Constant for each channel is 1, indicating that the channel's output will always be set to the commanded value. If you configure a channel's bit value to 0, the channel's output will ignore the commanded output value and will hold its last value.

Fallback Behavior

Behavior of this FTB device differs from that of the STB I/O modules when certain system events occur as described in the following table.

Event	Behavior

• Fieldbus communications is lost (and NIM is configured to detect the failure).
• NIM fails or power is removed from the NIM.
• CAN cable between this FTB device and the Advantys CANopen Extension module is disconnected.
• Cable between the EOS and BOS (if configured) is removed.
• While the Advantys configuration software is in online mode, one of the following operations is performed.
  • Download a new island configuration
  • Issue a Reset command
  • Issue a Store to SIM Card command
	The FTB output channels go to a predefined state known as the *error value output*. Error value output depends on how the user configures output error mode *(see page 44)* and output error value *(see page 44)*.

Stop PLC operation.	Depends upon the configuration of he fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, a Stop command is issued.	Output channels remain in their last known states regardless of output error mode *(see page 44)* and output error value *(see page 44)* settings.

Non-Recommended Feature

The following feature (available only in Version 1.x of the Advantys configuration software) is not recommended when the FTB device is connected to the Advantys STB island.

- Do not use the mandatory module feature on any module in the island that includes an FTB device. The FTB device does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

Advantys FTB 1CN08E08SP0 Process Image

Output Data

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by an HMI panel connected to the NIM's CFG port. The FTB 1CN08E08SP0 uses 1 register in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The FTB 1CN08E08SP0 uses 1 register in the output data block. Its specific position in the process image is based on the module's node address on the island bus.

Input Data

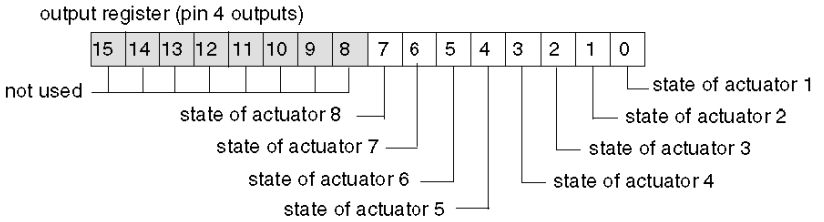
The FTB 1CN08E08SP0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in five 16-bit registers. This information can be read by the fieldbus master or an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 5 contiguous registers in this block. If the splitter box is configured to support inputs, the input data register appears first, followed by the diagnostic registers. The specific registers used are determined by the box's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Output Registers

Each of the 8 M12 round sockets on the splitter box supports an actuator output via pin 4. Pin 4 data is reported in the output process image register used by the FTB 1CN08E08SP0 splitter box.

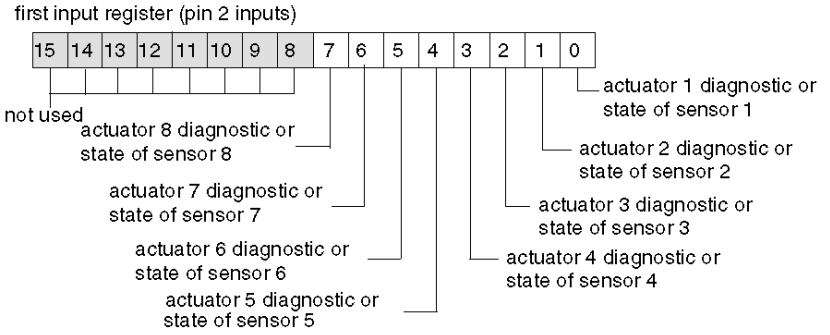

output register (pin 4 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 8
state of actuator 7
state of actuator 6
state of actuator 5
state of actuator 4
state of actuator 3
state of actuator 2
state of actuator 1

Input/Diagnostic Registers

By default, pin 2 on each socket is configured to report diagnostics for the associated actuator output. This diagnostic data is reported in the input process image.

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input. When pin 2 on a socket is configured for an input, the output on pin 4 of that socket does not report diagnostics.

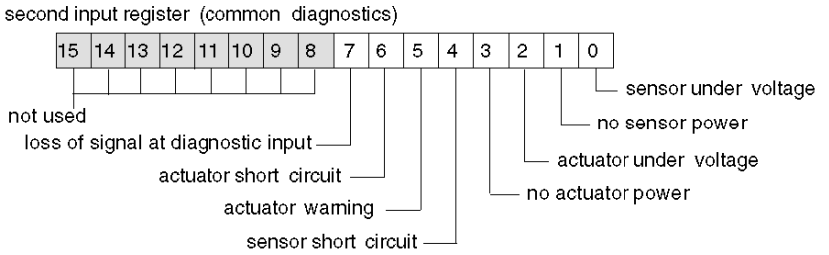
The first input process image register reports pin 2 data as follows.


first input register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 diagnostic or state of sensor 8
actuator 7 diagnostic or state of sensor 7
actuator 6 diagnostic or state of sensor 6
actuator 5 diagnostic or state of sensor 5
actuator 4 diagnostic or state of sensor 4
actuator 3 diagnostic or state of sensor 3
actuator 2 diagnostic or state of sensor 2
actuator 1 diagnostic or state of sensor 1

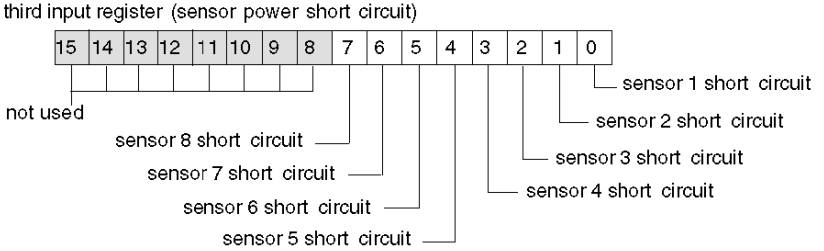
When pin 2 on any channel is configured for diagnostics, its associated bit value in the first input register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

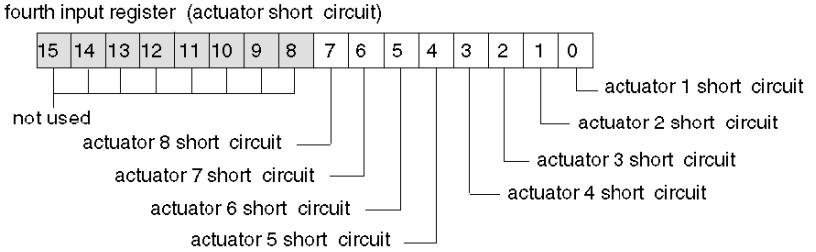
The second input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


second input register (common diagnostics)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator short circuit
actuator warning
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

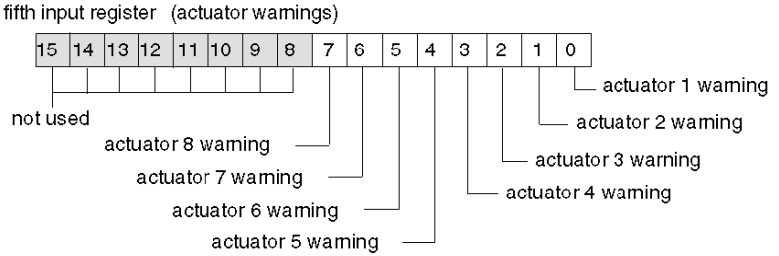
The third input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


third input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
sensor 8 short circuit
sensor 7 short circuit
sensor 6 short circuit
sensor 5 short circuit
sensor 4 short circuit
sensor 3 short circuit
sensor 2 short circuit
sensor 1 short circuit

The fourth input register reports actuator short circuit status, regardless of how the channels are configured. A returned bit value of 1 indicates a detected short circuit on an output.


fourth input register (actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 short circuit
actuator 7 short circuit
actuator 6 short circuit
actuator 5 short circuit
actuator 4 short circuit
actuator 3 short circuit
actuator 2 short circuit
actuator 1 short circuit

The fifth input register reports actuator warnings, regardless of how the channels are configured. A returned bit value of 1 indicates a detected warning condition on an output.


fifth input register (actuator warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 warning
actuator 7 warning
actuator 6 warning
actuator 5 warning
actuator 4 warning
actuator 3 warning
actuator 2 warning
actuator 1 warning

2.4 Advantys FTB 1CN08E08CM0 Splitter Box

Overview

When you select an Advantys FTB 1CN08E08CM0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel splitter box. By default, this box supports 8 sensor inputs with integrated diagnostics. You may reconfigure any or all of the 8 sensor inputs as actuator outputs, and you may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs. Overall, this box supports a combination of up to 16 sensor inputs or 8 actuator outputs.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN08E08CM0 Functional Description	52
Advantys FTB 1CN08E08CM0 Process Image	57

Advantys FTB 1CN08E08CM0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN08E08CM0 device, encased in metal, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN08E08CM0 Functional Description

Overview

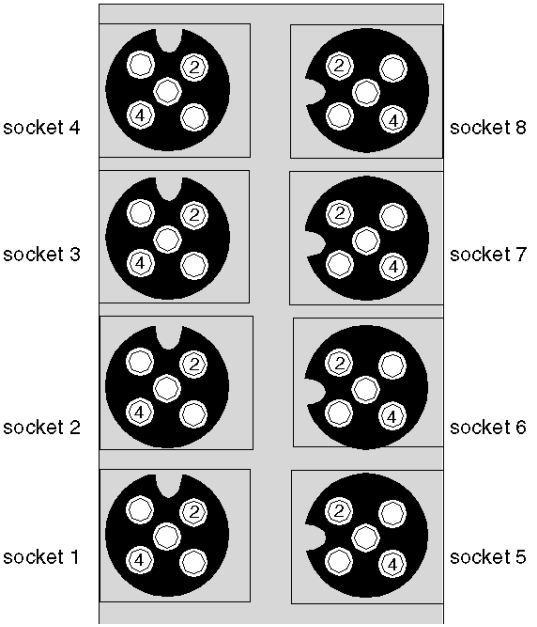
When you open the FTB 1CN08E08CM0 splitter box in the Module Editor in the Advantys configuration software, you may:

- configure pin 2 on each socket to report either I/O diagnostics or the states of up to 8 additional sensor inputs (in any combination). By default, pin 2 is configured to report I/O diagnostics.
- configure pin 4 on each socket to report the states of up to 8 sensor inputs or up to 8 actuator outputs (in any combination). By default, pin 4 is configured to report states of 8 sensor inputs.
- set a filtering constant for each actuator output and sensor input
- define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated actuator.

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated channel to report the state of an additional sensor input. When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated actuator or sensor.



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	state of actuator 1
	2	diagnostic for sensor 1 or actuator 1	state of sensor 9
2	4	state of sensor 2	state of actuator 2
	2	diagnostic for sensor 2 or actuator 2	state of sensor 10
3	4	state of sensor 3	state of actuator 3
	2	diagnostic for sensor 3 or actuator 3	state of sensor 11
4	4	state of sensor 4	state of actuator 4
	2	diagnostic for sensor 4 or actuator 4	state of sensor 12
5	4	state of sensor 5	state of actuator 5
	2	diagnostic for sensor 5 or actuator 5	state of sensor 13
6	4	state of sensor 6	state of actuator 6
	2	diagnostic for sensor 6 or actuator 6	state of sensor 14

Socket	Pin	Default Setting	Optional Configurable Setting
7	4	state of sensor 7	state of actuator 7
	2	diagnostic for sensor 7 or actuator 7	state of sensor 15
8	4	state of sensor 8	state of actuator 8
	2	diagnostic for sensor 8 or actuator 8	state of sensor 16

The pin 2 data is reported in the second input register for the FTB 1CN08E08CM0 splitter box in the input process image *(see page 57)*.

Input/Output Parameters

You can configure pin 4 on each of the 8 sockets to support either a sensor input or an actuator output. You may also configure pin 2 on each channel to provide diagnostics for the input or output on pin 4 of that socket. This is the default setting for pin 2 on each socket.

- To configure the signal on pin 4 of any of the 8 sockets as an *output signal*, set the associated bit in the Input/Output at Pin 4 parameter to 1. If you set a value of 1 to that bit, pin 4 on the channel is configured as an output.
- To configure the signal on pin 4 of any of the 8 sockets as an *input signal*, set the associated bit in the Input/Output at Pin 4 paramter to 0. If you set a value of 0 to that bit, pin 4 on that channel is configured as an input.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. If you configure a channel's bit value to 1, any input that might be received on that channel is ignored. The filter constant may also be used to disable/enable channels that are configured for diagnostics.

Output Error Modes

When communications are lost between the splitter box and the fieldbus master, the box's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Output Filter Constant

By default, the Output Filter Constant for each channel is 1, indicating that the channel's output will always be set to the commanded value. If you configure a channel's bit value to 0, the channel's output will ignore the commanded output value and will hold its last value.

Fallback Behavior

Behavior of this FTB device differs from that of the STB I/O modules when certain system events occur as described in the following table.

Event	Behavior

• Fieldbus communications is lost (and NIM is configured to detect the failure).
• NIM fails or power is removed from the NIM.
• CAN cable between this FTB device and the Advantys CANopen Extension module is disconnected.
• Cable between the EOS and BOS (if configured) is removed.
• While the Advantys configuration software is in online mode, one of the following operations is performed.
  • Download a new island configuration
  • Issue a Reset command
  • Issue a Store to SIM Card command
	The FTB output channels go to a predefined state known as the *error value output*. Error value output depends on how the user configures output error mode *(see page 54)* and output error value *(see page 55)*.

Stop PLC operation.	Depends upon the configuration of he fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, a Stop command is issued.	Output channels remain in their last known states regardless of output error mode *(see page 54)* and output error value *(see page 55)* settings.

Non-Recommended Feature

The following feature (available only in Version 1.x of the Advantys configuration software) is not recommended when the FTB device is connected to the Advantys STB island.

- Do not use the mandatory module feature on any module in the island that includes an FTB device. The FTB device does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

Advantys FTB 1CN08E08CM0 Process Image

Input Data

The FTB 1CN08E08CM0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in six 16-bit registers. This information can be read by the fieldbus master or by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 6 contiguous registers in this block. The input data registers appear first, followed by the diagnostic registers. The specific registers used are determined by the box's node address on the island bus.

Output Data

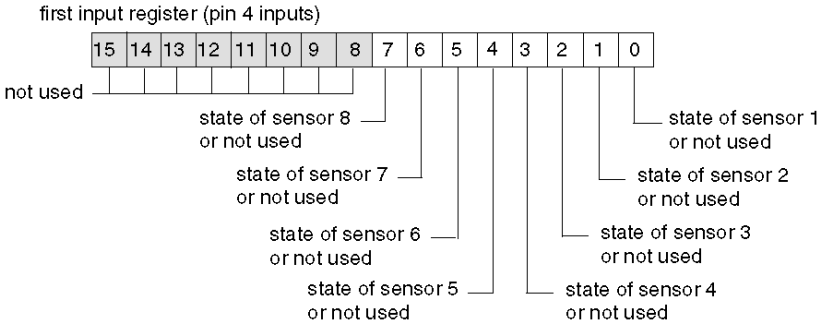
The NIM keeps a record of any output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or an HMI panel connected to the NIM's CFG port.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The FTB 1CN08E08CM0 uses 1 register in the output data block. Its specific position in the process image is based on the module's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input/Diagnostic Registers

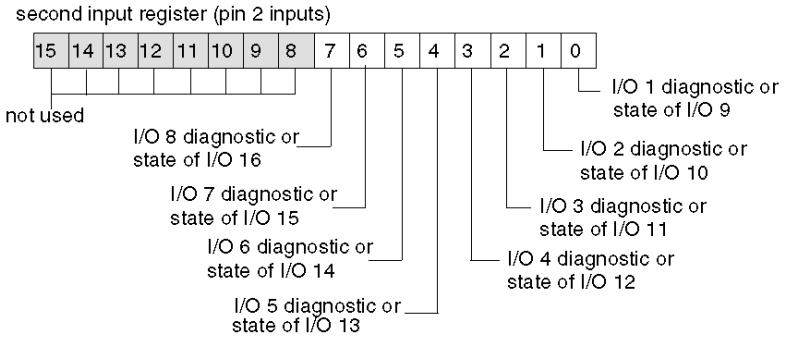
By default, the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. Pin 4 input data is reported in the first register used by the FTB 1CN08E08CM0 splitter box in the input process image. You may configure pin 4 on any of the channels to support outputs. In this case, the state of the outputs is reported in the output process image, and the associated bits in this register are not used.


first input register (pin 4 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of sensor 8 or not used
state of sensor 7 or not used
state of sensor 6 or not used
state of sensor 5 or not used
state of sensor 4 or not used
state of sensor 3 or not used
state of sensor 2 or not used
state of sensor 1 or not used

By default, pin 2 on each socket is configured to report diagnostics for the associated input or output channels. This diagnostic data is reported in the input process image.

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input.

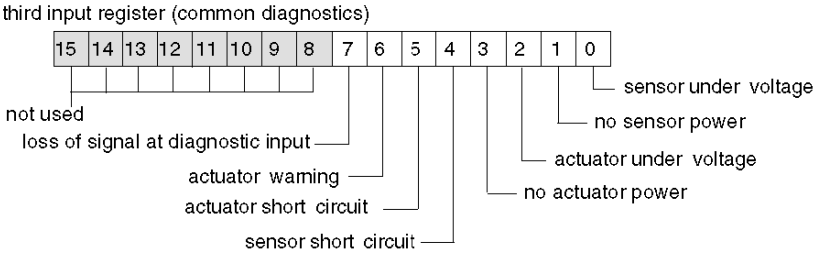
The second input process image register reports pin 2 data as follows.


second input register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
I/O 8 diagnostic or state of I/O 16
I/O 7 diagnostic or state of I/O 15
I/O 6 diagnostic or state of I/O 14
I/O 5 diagnostic or state of I/O 13
I/O 4 diagnostic or state of I/O 12
I/O 3 diagnostic or state of I/O 11
I/O 2 diagnostic or state of I/O 10
I/O 1 diagnostic or state of I/O 9

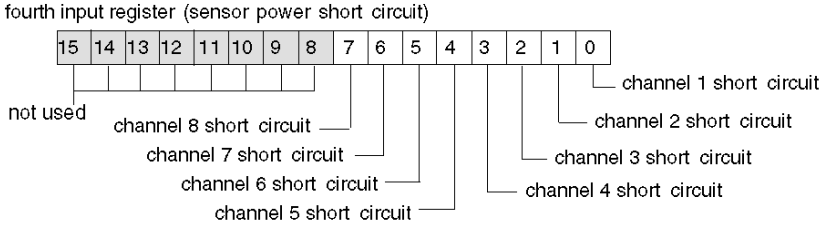
When pin 2 on any channel is configured for diagnostics, its associated bit value in the first input register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2. The associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2. The associated LED is off.

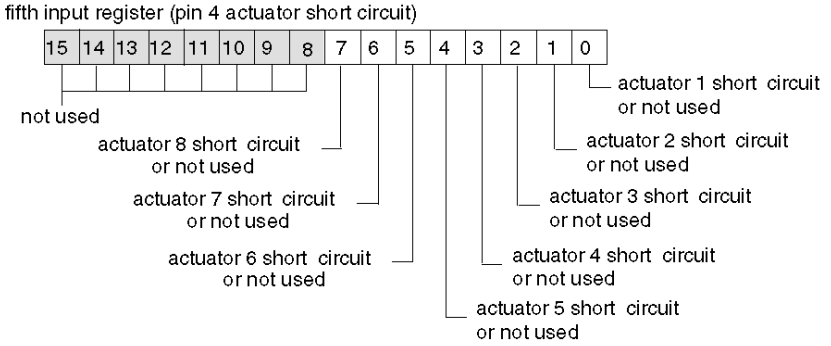
The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third input register (common diagnostics)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator warning
actuator short circuit
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

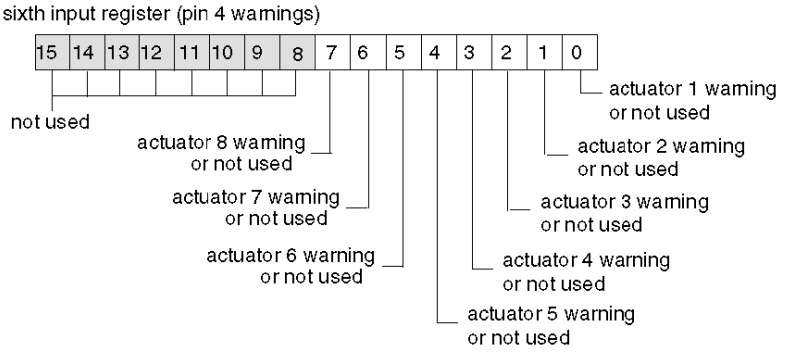
The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

The fifth input register reports actuator short-circuit status on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected short circuit on the associated actuator output.

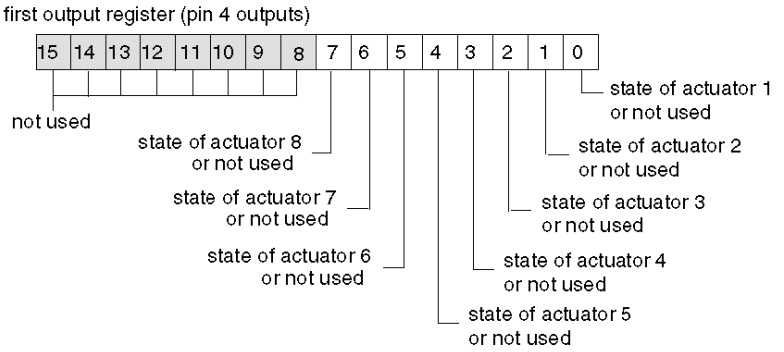

fifth input register (pin 4 actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 short circuit or not used
actuator 7 short circuit or not used
actuator 6 short circuit or not used
actuator 5 short circuit or not used
actuator 4 short circuit or not used
actuator 3 short circuit or not used
actuator 2 short circuit or not used
actuator 1 short circuit or not used

The sixth input register reports actuator warnings on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected warning condition on the associated actuator output.


sixth input register (pin 4 warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 warning or not used
actuator 7 warning or not used
actuator 6 warning or not used
actuator 5 warning or not used
actuator 4 warning or not used
actuator 3 warning or not used
actuator 2 warning or not used
actuator 1 warning or not used

Output Registers

By default, the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. You may configure pin 4 on any of the channels to support outputs. In this case, the state of the outputs is reported in the first register of the output process image used by the FTB 1CN08E08CM0. When pin 4 of is configured to support an input, the associated bit in this register is not used.


first output register (pin 4 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 8 or not used
state of actuator 7 or not used
state of actuator 6 or not used
state of actuator 5 or not used
state of actuator 4 or not used
state of actuator 3 or not used
state of actuator 2 or not used
state of actuator 1 or not used

2.5 Advantys FTB 1CN12E04SP0 Splitter Box

Overview

When you select an Advantys FTB 1CN12E04SP0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel I/O splitter box. By default, this box supports 4 sensor inputs and 4 actuator outputs, each with integrated diagnostics. You may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs. Overall, this box supports a combination of 4 actuator outputs and up to 12 sensor inputs.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN12E04SP0 Splitter Box Overview	62
Advantys FTB 1CN12E04SP0 Functional Description	63
Advantys FTB 1CN12E04SP0 Process Image	67

Advantys FTB 1CN12E04SP0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN12E04SP0 device, encased in plastic, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). Some of the important steps are described below to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN12E04SP0 Functional Description

Overview

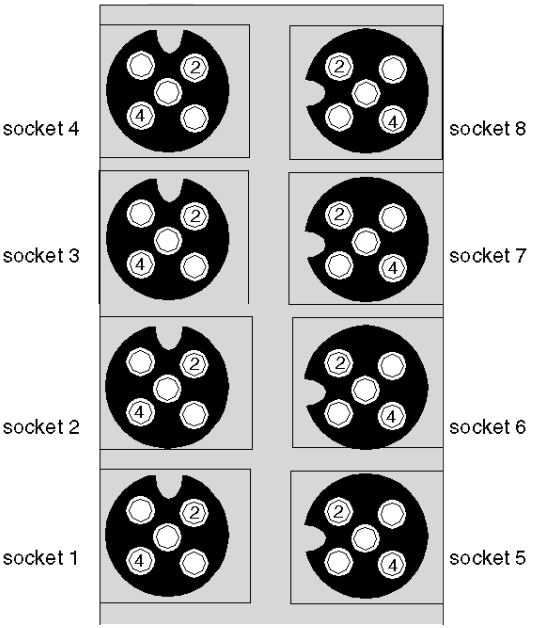
When you open the FTB 1CN12E04SP0 splitter box in the Module Editor in the Advantys configuration software, you may:

- configure pin 2 on each socket to report either I/O diagnostics or the states of up to 8 additional sensor inputs
- set a filtering constant for each actuator output and sensor input
- define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated actuator or sensor.

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated channel to report the state of a sensor (in the range 5 through 12). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated actuator or sensor.



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	N/A
	2	diagnostic for sensor 1	state of sensor 5
2	4	state of sensor 2	N/A
	2	diagnostic for sensor 2	state of sensor 6
3	4	state of sensor 3	N/A
	2	diagnostic for sensor 3	state of sensor 7
4	4	state of sensor 4	N/A
	2	diagnostic for sensor 4	state of sensor 8
5	4	state of actuator 1	N/A
	2	diagnostic for actuator 1	state of sensor 9
6	4	state of actuator 2	N/A
	2	diagnostic for actuator 2	state of sensor 10
7	4	state of actuator 3	N/A
	2	diagnostic for actuator 3	state of sensor 11
8	4	state of actuator 4	N/A
	2	diagnostic for actuator 4	state of sensor 12

The pin 2 data is reported in the second input register dedicated to the FTB 1CN12E04SP0 splitter box in the input process image *(see page 67)*.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. If you configure a channel's bit value to 1, any input that might be received on that channel is ignored. The filter constant may also be used to disable/enable channels that are configured for diagnostics.

Output Error Modes

When communications are lost between the splitter box and the fieldbus master, the box's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Output Filter Constant

By default, the Output Filter Constant for each channel is 1, indicating that the channel's output will always be set to the commanded value. If you configure a channel's bit value to 0, the channel's output will ignore the commanded output value and will hold its last value.

Fallback Behavior

Behavior of this FTB device differs from that of the STB I/O modules when certain system events occur as described in the following table.

Event	Behavior

• Fieldbus communications is lost (and NIM is configured to detect the failure).
• NIM fails or power is removed from the NIM.
• CAN cable between this FTB device and the Advantys CANopen Extension module is disconnected.
• Cable between the EOS and BOS (if configured) is removed.
• While the Advantys configuration software is in online mode, one of the following operations is performed.
  • Download a new island configuration
  • Issue a Reset command
  • Issue a Store to SIM Card command
	The FTB output channels go to a predefined state known as the *error value output*. Error value output depends on how the user configures output error mode *(see page 65)* and output error value *(see page 65)*.

Stop PLC operation.	Depends upon the configuration of he fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, a Stop command is issued.	Output channels remain in their last known states regardless of output error mode *(see page 65)* and output error value *(see page 65)* settings.

Non-Recommended Feature

The following feature (available only in Version 1.x of the Advantys configuration software) is not recommended when the FTB device is connected to the Advantys STB island.

- Do not use the mandatory module feature on any module in the island that includes an FTB device. The FTB device does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

Advantys FTB 1CN12E04SP0 Process Image

Output Data

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by an HMI panel connected to the NIM's CFG port. The FTB 1CN12E04SP0 uses 1 register in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The FTB 1CN12E04SP0 uses 1 register in the output data block. Its specific position in the process image is based on the module's node address on the island bus.

Input Data

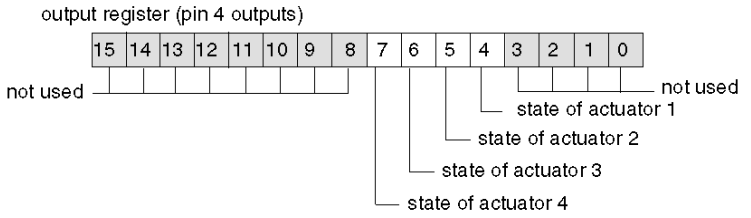
The FTB 1CN12E04SP0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in six 16-bit registers. This information can be read by the fieldbus master or an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 6 contiguous registers in this block. The input data register appears first, followed by the diagnostic registers. The specific registers used are determined by the box's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

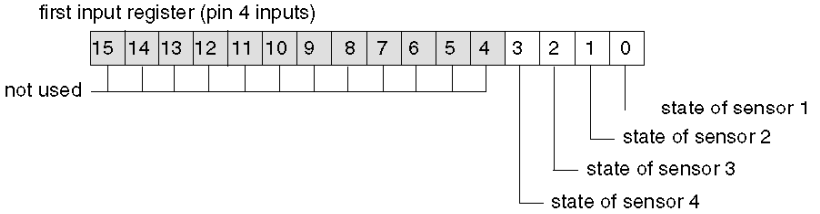
Output Registers

Four of the 8 M12 round sockets on the splitter box support actuator outputs via pin 4. This pin 4 data is reported in the output process image register used by the FTB 1CN12E04SP0 splitter box.



Input/Diagnostic Registers

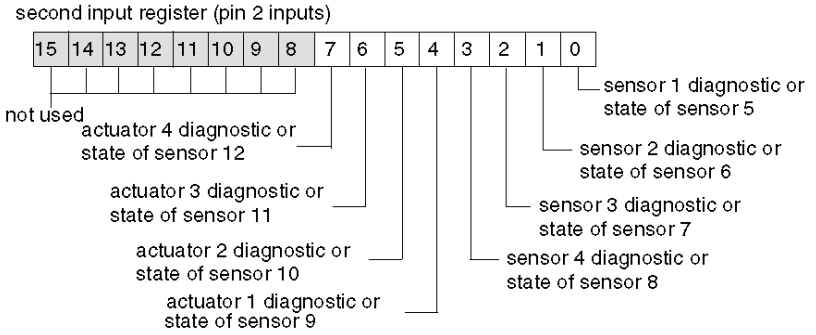
The other 4 of the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. This pin 4 data is reported in the first register used by the FTB 1CN12E04SP0 splitter box in the input process image.


first input register (pin 4 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of sensor 1
state of sensor 2
state of sensor 3
state of sensor 4

By default, pin 2 on each socket is configured to report diagnostics for the associated input or output channel. This diagnostic data is reported in the input process image. Sensor input diagnostics are reported are reported in bits 0 through 3; actuator output diagnostics are reported in bits 4 through 8 of the second input word.

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input. When pin 2 on a socket is configured for an input, the input or output on pin 4 of that socket does not report diagnostics.

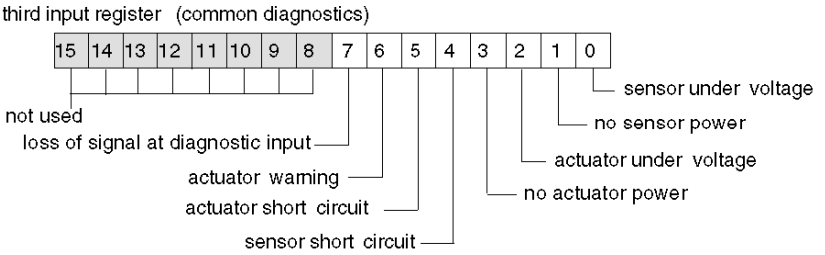
The second input process image register reports pin 2 data as follows.


second input register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 4 diagnostic or state of sensor 12
actuator 3 diagnostic or state of sensor 11
actuator 2 diagnostic or state of sensor 10
actuator 1 diagnostic or state of sensor 9
sensor 1 diagnostic or state of sensor 5
sensor 2 diagnostic or state of sensor 6
sensor 3 diagnostic or state of sensor 7
sensor 4 diagnostic or state of sensor 8

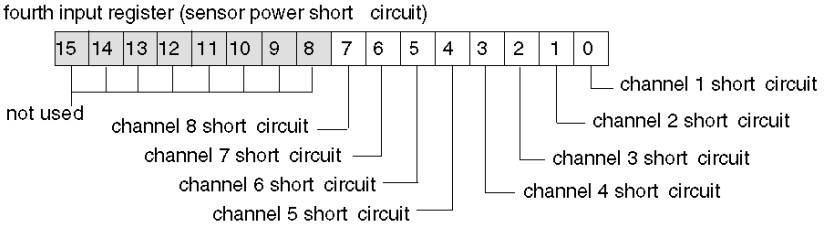
When pin 2 on any channel is configured for diagnostics, its associated bit value in the first input register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

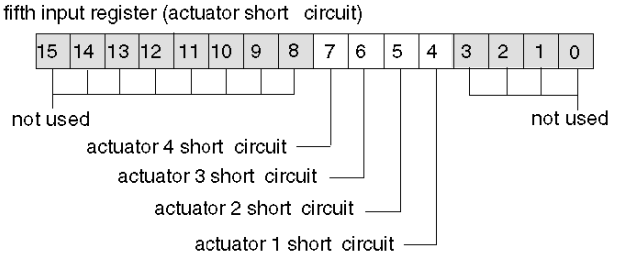
The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third input register (common diagnostics)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator warning
actuator short circuit
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

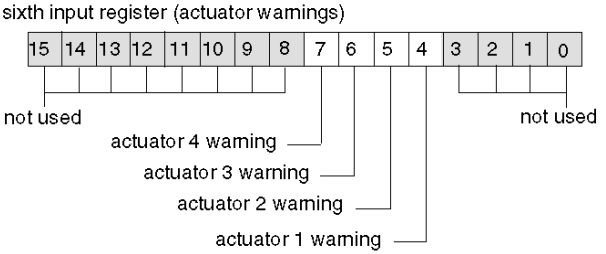
The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

The fifth input register reports actuator short-circuit status, regardless of how the channels are configured. A returned bit value of 1 indicates a detected short circuit on an output.


fifth input register (actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 4 short circuit
actuator 3 short circuit
actuator 2 short circuit
actuator 1 short circuit
not used

The sixth input register reports actuator warnings, regardless of how the channels are configured. A returned bit value of 1 indicates a detected warning condition on an output.



2.6 Advantys FTB 1CN16CP0 Splitter Box

Overview

When you select an Advantys FTB 1CN16CP0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel I/O splitter box. By default, this box supports 8 sensor inputs with integrated diagnostics. You may reconfigure any or all of the 8 default sensor inputs as actuator outputs, and you may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs or actuator outputs. Overall, this box supports up to 16 sensor inputs and actuator outputs in any combination.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN16CP0 Functional Description	73
Advantys FTB 1CN16CP0 Process Image	78

Advantys FTB 1CN16CP0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN16CP0 device, encased in plastic, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN16CP0 Functional Description

Overview

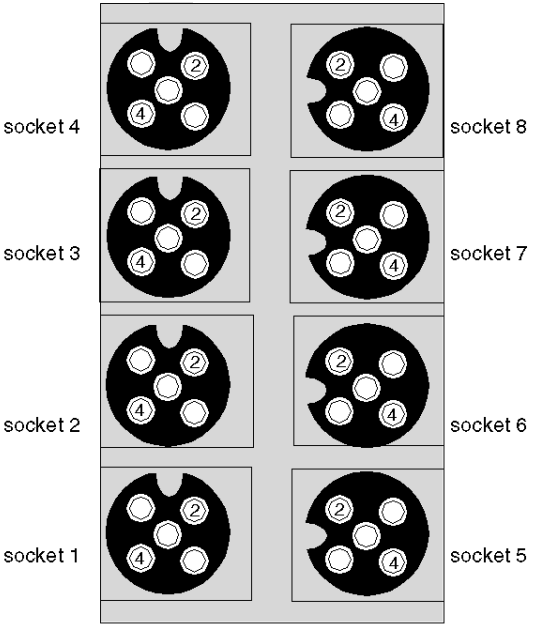
When you open the FTB 1CN16CP0 splitter box in the Module Editor in the Advantys configuration software, you may:

- configure pin 2 on each socket to report either I/O diagnostics or the states of up to 8 additional sensor inputs or actuator outputs (in any combination)
- configure pin 4 on each socket to report the states of up to 8 additional actuator outputs (in any combination)
- set a filtering constant for each actuator output and sensor input
- define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated sensor.

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated channel to report the state of an input or an output (an input by default, but it can be changed to an output). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated actuator or sensor.



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	state of actuator 1
	2	diagnostic for sensor 1 or actuator 1	state of sensor 9 or actuator 9
2	4	state of sensor 2	state of actuator 2
	2	diagnostic for sensor 2 or actuator 2	state of sensor 10 or actuator 10
3	4	state of sensor 3	state of actuator 3
	2	diagnostic for sensor 3 or actuator 3	state of sensor 11 or actuator 11
4	4	state of sensor 4	state of actuator 4
	2	diagnostic for sensor 4 or actuator 4	state of sensor 12 or actuator 12
5	4	state of sensor 5	state of actuator 5
	2	diagnostic for sensor 5 or actuator 5	state of sensor 13 or actuator 13
6	4	state of sensor 6	state of actuator 6
	2	diagnostic for sensor 6 or actuator 6	state of sensor 14 or actuator 14

Socket	Pin	Default Setting	Optional Configurable Setting
7	4	state of sensor 7	state of actuator 7
	2	diagnostic for sensor 7 or actuator 7	state of sensor 15 or actuator 15
8	4	state of sensor 8	state of actuator 8
	2	diagnostic for sensor 8 or actuator 8	state of sensor 16 or actuator 16

The pin 2 data is reported in the second input register for to the FTB 1CN16CP0 splitter box in the input process image *(see page 79)*.

Input/Output Parameters

You have the ability to configure pin 4 and pin 2 on each of the 8 sockets to support either a sensor input or an actuator output. (You may also configure pin 2 on each channel to provide diagnostics for the input or output on pin 4 of that socket; this is the default setting for pin 2 on each socket.) Two 8-channel parameters in the Module editor of the Advantys configuration software are provided to define up to 16 I/O channels in any combination.

To configure the signal on pin 4 of any of the 8 sockets as an input signal, set the associated bit in the *Input/Output at Pin 4* parameter to 0. If you set a value of 1 to that bit, pin 4 on that channel is configured as an output.

To configure the signal on pin 2 of any of the 8 sockets as an input signal, make sure that the Input/Diagnostic parameter is set to 0. Then set the associated bit in the *Input/Output at Pin 2* parameter to 0. (0 is the default setting for this parameter on all channels.) If you set a value of 1 to that bit, pin 4 on that channel is configured as an output.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. If you configure a channel's bit value to 1, any input that might be received on that channel is ignored. The filter constant may also be used to disable/enable channels that are configured for diagnostics.

Output Error Modes

When communications are lost between the splitter box and the fieldbus master, the box's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Output Filter Constant

By default, the Output Filter Constant for each channel is 1, indicating that the channel's output will always be set to the commanded value. If you configure a channel's bit value to 0, the channel's output will ignore the commanded output value and will hold its last value.

Fallback Behavior

Behavior of this FTB device differs from that of the STB I/O modules when certain system events occur as described in the following table.

Event	Behavior

• Fieldbus communications is lost (and NIM is configured to detect the failure).
• NIM fails or power is removed from the NIM.
• CAN cable between this FTB device and the Advantys CANopen Extension module is disconnected.
• Cable between the EOS and BOS (if configured) is removed.
• While the Advantys configuration software is in online mode, one of the following operations is performed.
  • Download a new island configuration
  • Issue a Reset command
  • Issue a Store to SIM Card command
	The FTB output channels go to a predefined state known as the *error value output*. Error value output depends on how the user configures output error mode *(see page 76)* and output error value *(see page 76)*.

Stop PLC operation.	Depends upon the configuration of he fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, a Stop command is issued.	Output channels remain in their last known states regardless of output error mode *(see page 76)* and output error value *(see page 76)* settings.

Non-Recommended Feature

The following feature (available only in Version 1.x of the Advantys configuration software) is not recommended when the FTB device is connected to the Advantys STB island.

- Do not use the mandatory module feature on any module in the island that includes an FTB device. The FTB device does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

Advantys FTB 1CN16CP0 Process Image

Input Data

The FTB 1CN16CP0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in eight 16-bit registers. This information can be read by the fieldbus master or by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 8 contiguous registers in this block. The input data registers appear first, followed by the diagnostic registers. The specific registers used are determined by the box's node address on the island bus.

Output Data

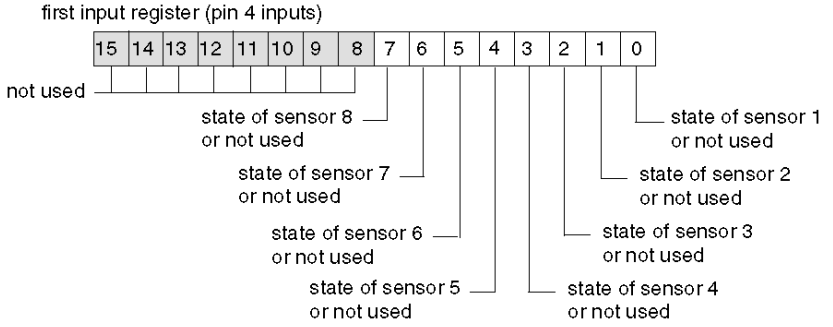
The NIM keeps a record of any output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or an HMI panel connected to the NIM's CFG port. The FTB 1CN16CP0 uses 2 registers in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The FTB 1CN16CP0 uses 2 contiguous registers in the output data block. Their specific position in the process image is based on the module's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input/Diagnostic Registers

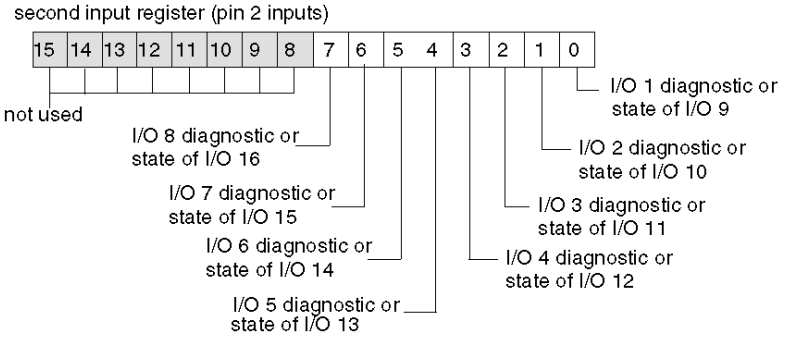
By default, the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. Pin 4 input data is reported in the first register used by the FTB 1CN16CP0 splitter box in the input process image. You may configure pin 4 on any of the channels to support outputs, in which case the state of the outputs is reported in the output process image and the associated bits in this register are not used.


first input register (pin 4 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of sensor 8 or not used
state of sensor 7 or not used
state of sensor 6 or not used
state of sensor 5 or not used
state of sensor 4 or not used
state of sensor 3 or not used
state of sensor 2 or not used
state of sensor 1 or not used

By default, pin 2 on each socket is configured to report diagnostics for the associated input or output channels. This diagnostic data is reported in the input process image.

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input or an actuator output. When pin 2 on a socket is configured for I/O, the input or output on pin 4 of that socket does not report diagnostics.

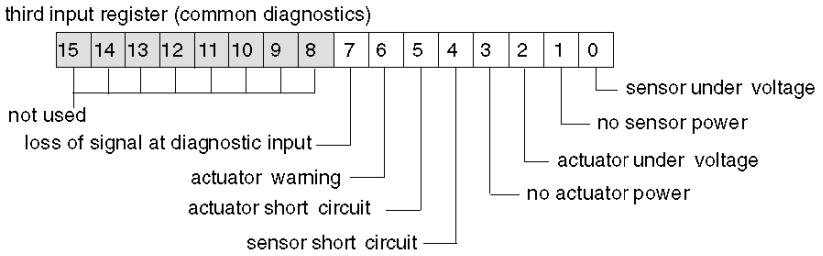
The second input process image register reports pin 2 data as follows.


second input register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
I/O 8 diagnostic or state of I/O 16
I/O 7 diagnostic or state of I/O 15
I/O 6 diagnostic or state of I/O 14
I/O 5 diagnostic or state of I/O 13
I/O 4 diagnostic or state of I/O 12
I/O 3 diagnostic or state of I/O 11
I/O 2 diagnostic or state of I/O 10
I/O 1 diagnostic or state of I/O 9

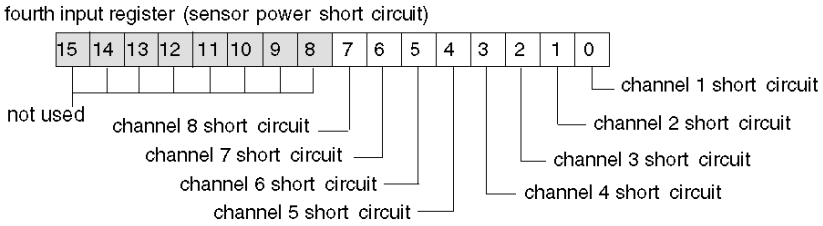
When pin 2 on any channel is configured for diagnostics, its associated bit value in the first input register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

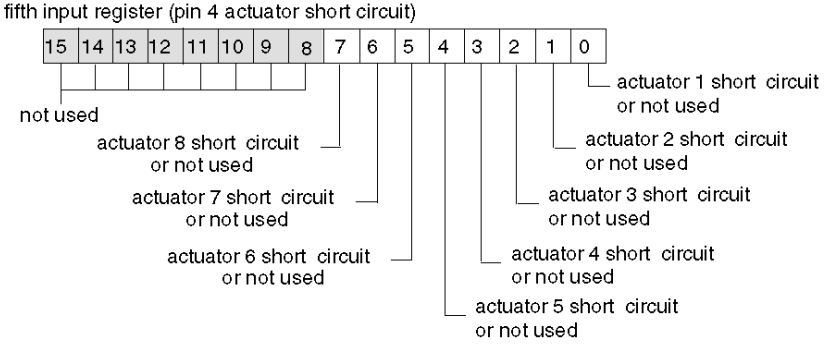
The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third input register (common diagnostics)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator warning
actuator short circuit
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

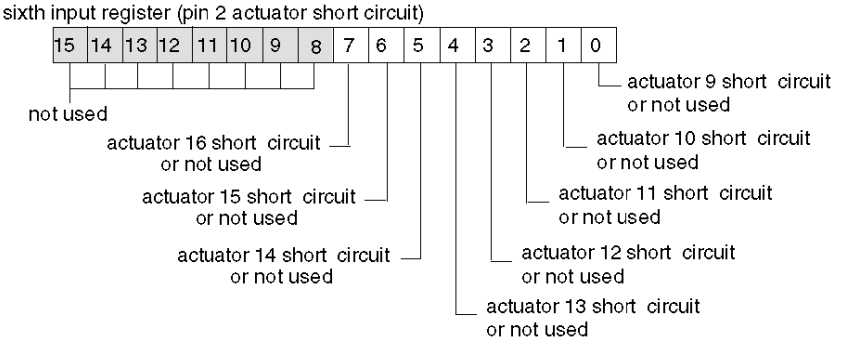
The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

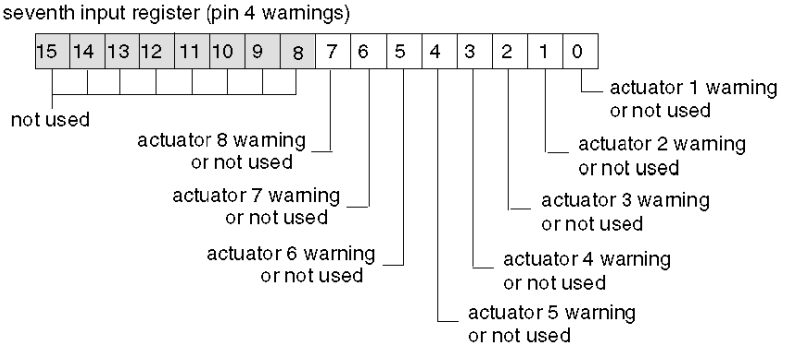
The fifth input register reports actuator short-circuit status on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected short circuit on the associated actuator output.


fifth input register (pin 4 actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 short circuit or not used
actuator 7 short circuit or not used
actuator 6 short circuit or not used
actuator 5 short circuit or not used
actuator 4 short circuit or not used
actuator 3 short circuit or not used
actuator 2 short circuit or not used
actuator 1 short circuit or not used

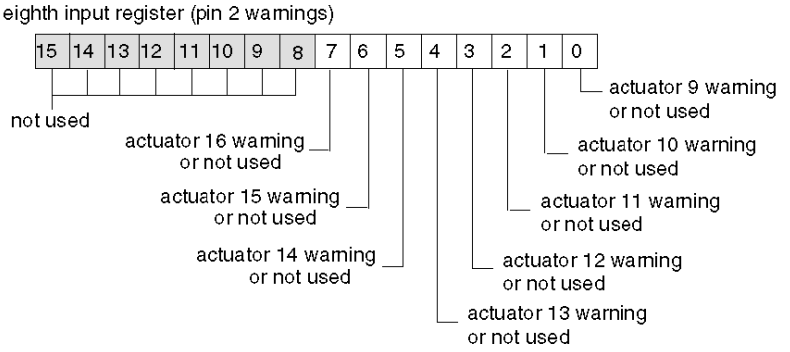
The sixth input register reports actuator short-circuit status on pin 2 of each socket. When pin 2 of a socket is configured to support an input or a diagnostic, the associated bit in this register is not used. A returned bit value of 1 indicates a detected short circuit on the associated actuator output.


sixth input register (pin 2 actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 16 short circuit or not used
actuator 15 short circuit or not used
actuator 14 short circuit or not used
actuator 13 short circuit or not used
actuator 12 short circuit or not used
actuator 11 short circuit or not used
actuator 10 short circuit or not used
actuator 9 short circuit or not used

The seventh input register reports actuator warnings on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected warning condition on the associated actuator output.

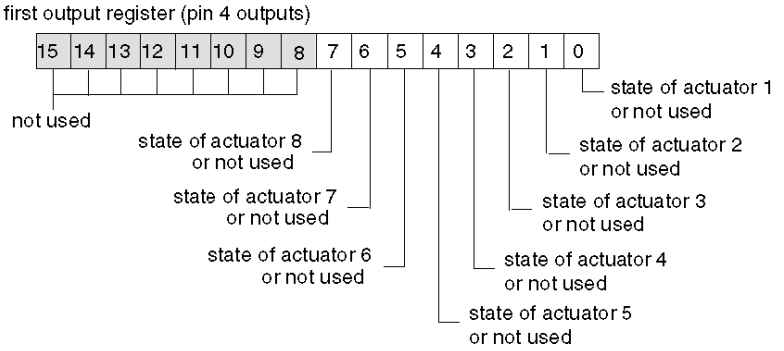

seventh input register (pin 4 warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 warning or not used
actuator 7 warning or not used
actuator 6 warning or not used
actuator 5 warning or not used
actuator 4 warning or not used
actuator 3 warning or not used
actuator 2 warning or not used
actuator 1 warning or not used

The eighth input register reports actuator warnings on pin 2 of each socket. When pin 2 of a socket is configured to support an input or a diagnostic, the associated bit in this register is not used. A returned bit value of 1 indicates a detected warning condition on the associated actuator output.


eighth input register (pin 2 warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 16 warning or not used
actuator 15 warning or not used
actuator 14 warning or not used
actuator 13 warning or not used
actuator 12 warning or not used
actuator 11 warning or not used
actuator 10 warning or not used
actuator 9 warning or not used

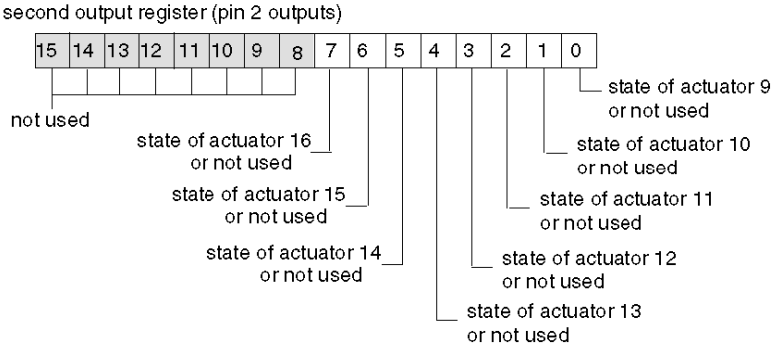
Output Registers

By default, the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. You may configure pin 4 on any of the channels to support outputs, in which case the state of the outputs is reported in the first register of the output process image used by the FTB 1CN16CP0. When pin 4 of is configured to support an input, the associated bit in this register is not used.


first output register (pin 4 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 8 or not used
state of actuator 7 or not used
state of actuator 6 or not used
state of actuator 5 or not used
state of actuator 4 or not used
state of actuator 3 or not used
state of actuator 2 or not used
state of actuator 1 or not used

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input or an actuator output. When pin 2 on a socket is configured for I/O, the input or output on pin 4 of that socket does not report diagnostics.

You may configure pin 2 on any of the channels to support outputs, in which case the state of the outputs is reported in the second register of the output process image used by the FTB 1CN16CP0. When pin 2 of is configured to support an input or a diagnostic, the associated bit in this register is not used.


second output register (pin 2 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 16 or not used
state of actuator 15 or not used
state of actuator 14 or not used
state of actuator 13 or not used
state of actuator 12 or not used
state of actuator 11 or not used
state of actuator 10 or not used
state of actuator 9 or not used

2.7 Advantys FTB 1CN16CM0 Splitter Box

Overview

When you select an Advantys FTB 1CN16CM0 device from the STB Catalog Browser in the Advantys configuration software, you select a multi-channel I/O splitter box. By default, this box supports 8 sensor inputs with integrated diagnostics. You may reconfigure any or all of the 8 default sensor inputs as actuator outputs, and you may reconfigure any or all of the 8 default diagnostic inputs as sensor inputs or actuator outputs. Overall, this box supports up to 16 sensor inputs and actuator outputs in any combination.

What's in this Section?

This section contains the following topics:

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Advantys FTB 1CN16CM0 Splitter Box Overview	85
Advantys FTB 1CN16CM0 Functional Description	86
Advantys FTB 1CN16CM0 Process Image	91

Advantys FTB 1CN16CM0 Splitter Box Overview

Setting Device Parameters for the Island Bus

The Advantys FTB 1CN16CM0 device, encased in metal, has 3 rotary switches to define the baud rate and set the node ID of the device on the STB island bus. The switch set-up procedure is defined in the *FTB 1CN-CANOPEN* user manual (W9 1606218 02 11 A01). The following table describes some of the important steps to help you configure the device as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate rotary switch to position 7.	The baud rate is set to 500 kbaud, which is the required operating baud rate for an Advantys STB island when it uses enhanced CANopen devices.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with this switch matches the address set in the Advantys configuration software for this device.

Advantys FTB 1CN16CM0 Functional Description

Overview

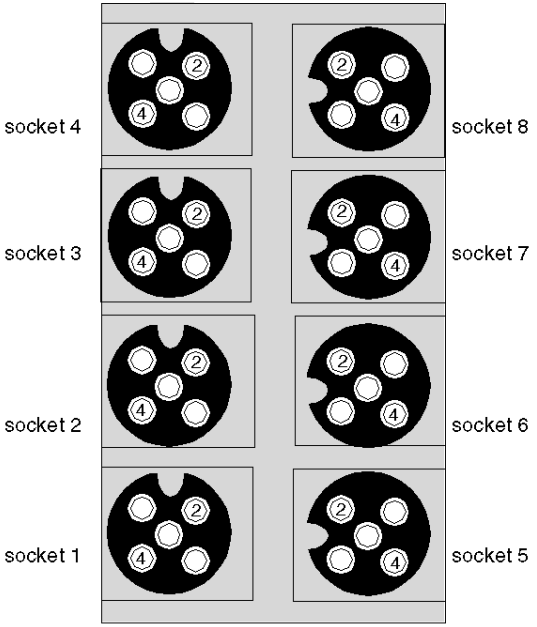
When you open the FTB 1CN16CM0 splitter box in the Module Editor in the Advantys configuration software, you may:

- configure pin 2 on each socket to report either I/O diagnostics or the states of up to 8 additional sensor inputs or actuator outputs (in any combination)
- configure pin 4 on each socket to report the states of up to 8 additional actuator outputs (in any combination)
- set a filtering constant for each actuator output and sensor input
- define the error mode and error value—i.e., the fallback mode and fallback state—of each actuator output

Input/Diagnostic Parameter

By default, the Input/Diagnostic parameter is set to a value of 1 on each channel—i.e., on each of the 8 M12 round sockets on the splitter box. A value of 1 indicates that pin 2 on a socket is reporting diagnostics for the associated sensor.

Optionally, you may set the value of any of these channels to 0, which configures pin 2 for the associated channel to report the state of an input or an output (an input by default, but it can be changed to an output). When the Input/Diagnostic parameter for a channel is set to 0, the module does not report diagnostics for the associated actuator or sensor.



Socket	Pin	Default Setting	Optional Configurable Setting
1	4	state of sensor 1	state of actuator 1
	2	diagnostic for sensor 1 or actuator 1	state of sensor 9 or actuator 9
2	4	state of sensor 2	state of actuator 2
	2	diagnostic for sensor 2 or actuator 2	state of sensor 10 or actuator 10
3	4	state of sensor 3	state of actuator 3
	2	diagnostic for sensor 3 or actuator 3	state of sensor 11 or actuator 11
4	4	state of sensor 4	state of actuator 4
	2	diagnostic for sensor 4 or actuator 4	state of sensor 12 or actuator 12
5	4	state of sensor 5	state of actuator 5
	2	diagnostic for sensor 5 or actuator 5	state of sensor 13 or actuator 13
6	4	state of sensor 6	state of actuator 6
	2	diagnostic for sensor 6 or actuator 6	state of sensor 14 or actuator 14

Socket	Pin	Default Setting	Optional Configurable Setting
7	4	state of sensor 7	state of actuator 7
	2	diagnostic for sensor 7 or actuator 7	state of sensor 15 or actuator 15
8	4	state of sensor 8	state of actuator 8
	2	diagnostic for sensor 8 or actuator 8	state of sensor 16 or actuator 16

The pin 2 data is reported in the second input register for to the FTB 1CN16CM0 splitter box in the input process image *(see page 91)*.

Input/Output Parameters

You have the ability to configure pin 4 and pin 2 on each of the 8 sockets to support either a sensor input or an actuator output. (You may also configure pin 2 on each channel to provide diagnostics for the input or output on pin 4 of that socket; this is the default setting for pin 2 on each socket.) Two 8-channel parameters in the Module editor of the Advantys configuration software are provided to define up to 16 I/O channels in any combination.

To configure the signal on pin 4 of any of the 8 sockets as an input signal, set the associated bit in the *Input/Output at Pin 4* parameter to 0. If you set a value of 1 to that bit, pin 4 on that channel is configured as an output.

To configure the signal on pin 2 of any of the 8 sockets as an input signal, make sure that the Input/Diagnostic parameter is set to 0. Then set the associated bit in the *Input/Output at Pin 2* parameter to 0. (0 is the default setting for this parameter on all channels.) If you set a value of 1 to that bit, pin 4 on that channel is configured as an output.

Input Filter Constant

By default, the Input Filter Constant is set to a value of 0 on each channel, indicating that the input from a particular sensor is always read. If you configure a channel's bit value to 1, any input that might be received on that channel is ignored. The filter constant may also be used to disable/enable channels that are configured for diagnostics.

Output Error Modes

When communications are lost between the splitter box and the fieldbus master, the box's output channels go to a predefined state known as the *error value output*. You may configure the error value output for each channel individually. An error value output is accomplished in 2 steps:

- first by configuring the error (or fallback) mode for each channel
- then, if necessary, by configuring the error value (or fallback state) for the channel

All output channels have an error mode—either *predefined state* or *hold last value*. When a channel has *predefined state* as its error mode, it may be configured with an error value, which can be any value in the valid range. When a channel has *hold last value* as its error mode, the channel will always remain in its last known state if communication is lost. It cannot be configured with a predefined error value.

Output error modes are configured at the channel level. By default, the value for each channel is 1, indicating a *predefined state* on each channel. If you set a channel's output error mode value to 0, the output error mode becomes *hold last value*.

Output Error Values

When an output channel's output error mode is a *predefined state*, you may set a value of either 0 or 1 as the value that the output will go to if communication is lost. The default output error value on all channels is 0.

Output Filter Constant

By default, the Output Filter Constant for each channel is 1, indicating that the channel's output will always be set to the commanded value. If you configure a channel's bit value to 0, the channel's output will ignore the commanded output value and will hold its last value.

Fallback Behavior

Behavior of this FTB device differs from that of the STB I/O modules when certain system events occur as described in the following table.

Event	Behavior

• Fieldbus communications is lost (and NIM is configured to detect the failure).
• NIM fails or power is removed from the NIM.
• CAN cable between this FTB device and the Advantys CANopen Extension module is disconnected.
• Cable between the EOS and BOS (if configured) is removed.
• While the Advantys configuration software is in online mode, one of the following operations is performed.
  • Download a new island configuration
  • Issue a Reset command
  • Issue a Store to SIM Card command
	The FTB output channels go to a predefined state known as the *error value output*. Error value output depends on how the user configures output error mode *(see page 89)* and output error value *(see page 89)*.

Stop PLC operation.	Depends upon the configuration of he fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, a Stop command is issued.	Output channels remain in their last known states regardless of output error mode *(see page 89)* and output error value *(see page 89)* settings.

Non-Recommended Feature

The following feature (available only in Version 1.x of the Advantys configuration software) is not recommended when the FTB device is connected to the Advantys STB island.

- Do not use the mandatory module feature on any module in the island that includes an FTB device. The FTB device does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

Advantys FTB 1CN16CM0 Process Image

Input Data

The FTB 1CN16CM0 sends a representation of the operating state of its input channels to the island's NIM. The NIM stores the information in eight 16-bit registers. This information can be read by the fieldbus master or by an HMI panel connected to the NIM's CFG port.

The input data process image is part of a block of 4096 registers (in the range 45392 to 49487) reserved in the NIM's memory. The splitter box is represented by 8 contiguous registers in this block. The input data registers appear first, followed by the diagnostic registers. The specific registers used are determined by the box's node address on the island bus.

Output Data

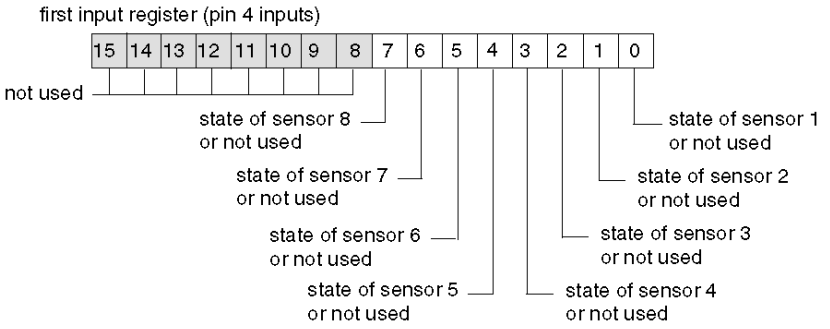
The NIM keeps a record of any output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or an HMI panel connected to the NIM's CFG port. The FTB 1CN16CM0 uses 2 registers in the output process image.

The output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data returned by the fieldbus master. Each output module on the island bus is represented in this data block. The FTB 1CN16CM0 uses 2 contiguous registers in the output data block. Their specific position in the process image is based on the module's node address on the island bus.

NOTE: The following data format is common across the island bus, regardless of the fieldbus on which the island is operating. The data is also transferred to and from the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input/Diagnostic Registers

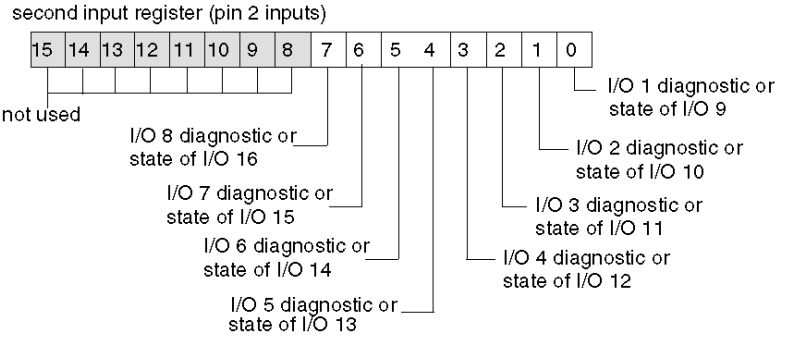
By default, the 8 M12 round sockets on the splitter box support sensor inputs via pin 4. Pin 4 input data is reported in the first register used by the FTB 1CN16CM0 splitter box in the input process image. You may configure pin 4 on any of the channels to support outputs, in which case the state of the outputs is reported in the output process image and the associated bits in this register are not used.


first input register (pin 4 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of sensor 8 or not used
state of sensor 7 or not used
state of sensor 6 or not used
state of sensor 5 or not used
state of sensor 4 or not used
state of sensor 3 or not used
state of sensor 2 or not used
state of sensor 1 or not used

By default, pin 2 on each socket is configured to report diagnostics for the associated input or output channels. This diagnostic data is reported in the input process image.

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input or an actuator output. When pin 2 on a socket is configured for I/O, the input or output on pin 4 of that socket does not report diagnostics.

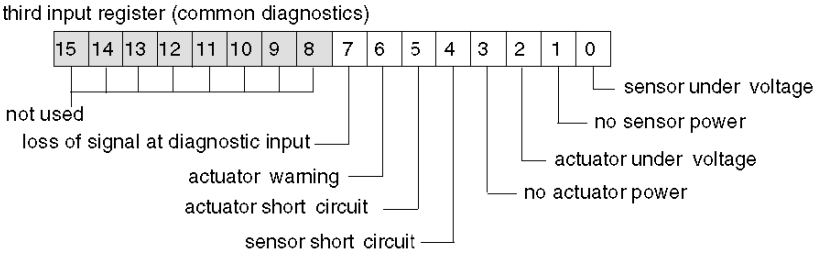
The second input process image register reports pin 2 data as follows.


second input register (pin 2 inputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
I/O 8 diagnostic or state of I/O 16
I/O 7 diagnostic or state of I/O 15
I/O 6 diagnostic or state of I/O 14
I/O 5 diagnostic or state of I/O 13
I/O 4 diagnostic or state of I/O 12
I/O 3 diagnostic or state of I/O 11
I/O 2 diagnostic or state of I/O 10
I/O 1 diagnostic or state of I/O 9

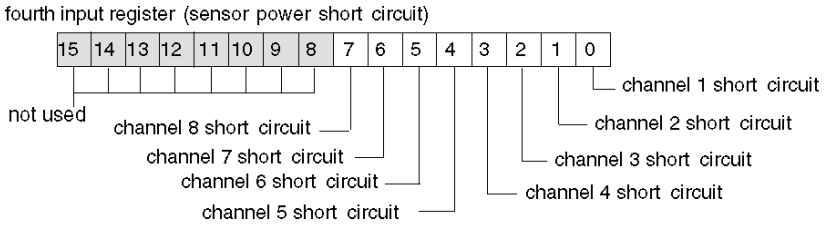
When pin 2 on any channel is configured for diagnostics, its associated bit value in the first input register is interpreted as follows.

- A value of 1 indicates that there is no signal at pin 2; the associated red LED turns on.
- A value of 0 indicates that there is a signal at pin 2; the associated LED is off.

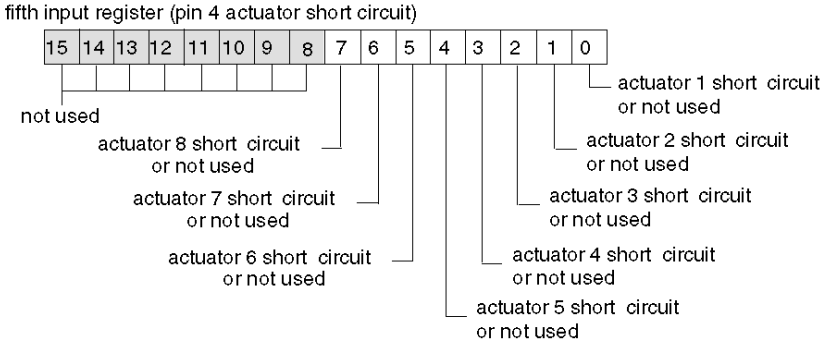
The third input register reports common diagnostics, regardless of how the channels are configured. A returned bit value of 1 indicates a detected problem.


third input register (common diagnostics)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
loss of signal at diagnostic input
actuator warning
actuator short circuit
sensor short circuit
no actuator power
actuator under voltage
no sensor power
sensor under voltage

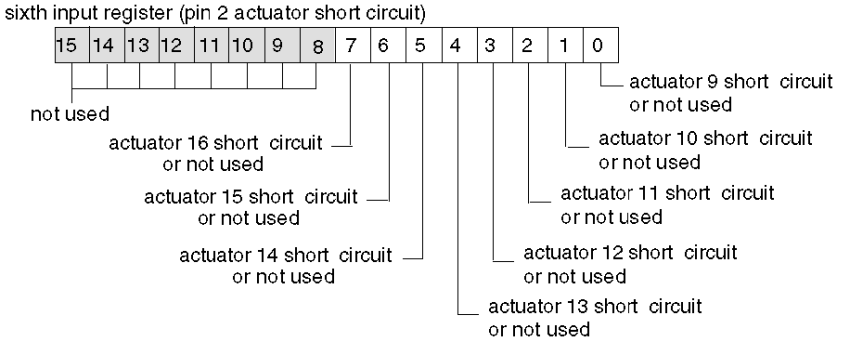
The fourth input register reports the detection of a short circuit on the sensor power supply for the 8 channels. A returned bit value of 1 indicates a detected short circuit on the associated channel.


fourth input register (sensor power short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
channel 8 short circuit
channel 7 short circuit
channel 6 short circuit
channel 5 short circuit
channel 4 short circuit
channel 3 short circuit
channel 2 short circuit
channel 1 short circuit

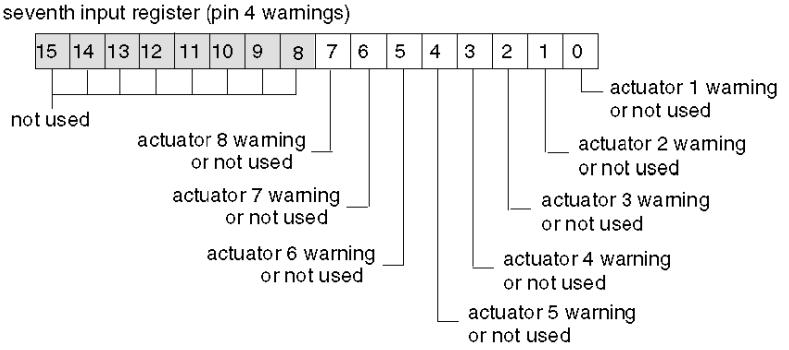
The fifth input register reports actuator short-circuit status on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected short circuit on the associated actuator output.


fifth input register (pin 4 actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 short circuit or not used
actuator 7 short circuit or not used
actuator 6 short circuit or not used
actuator 5 short circuit or not used
actuator 4 short circuit or not used
actuator 3 short circuit or not used
actuator 2 short circuit or not used
actuator 1 short circuit or not used

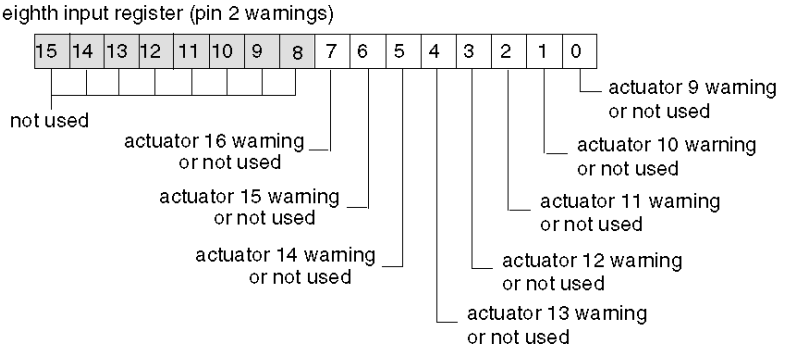
The sixth input register reports actuator short-circuit status on pin 2 of each socket. When pin 2 of a socket is configured to support an input or a diagnostic, the associated bit in this register is not used. A returned bit value of 1 indicates a detected short circuit on the associated actuator output.


sixth input register (pin 2 actuator short circuit)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 16 short circuit or not used
actuator 15 short circuit or not used
actuator 14 short circuit or not used
actuator 13 short circuit or not used
actuator 12 short circuit or not used
actuator 11 short circuit or not used
actuator 10 short circuit or not used
actuator 9 short circuit or not used

The seventh input register reports actuator warnings on pin 4 of each socket. When pin 4 of a socket is configured to support an input, the associated bit in this register is not used. A returned bit value of 1 indicates a detected warning condition on the associated actuator output.

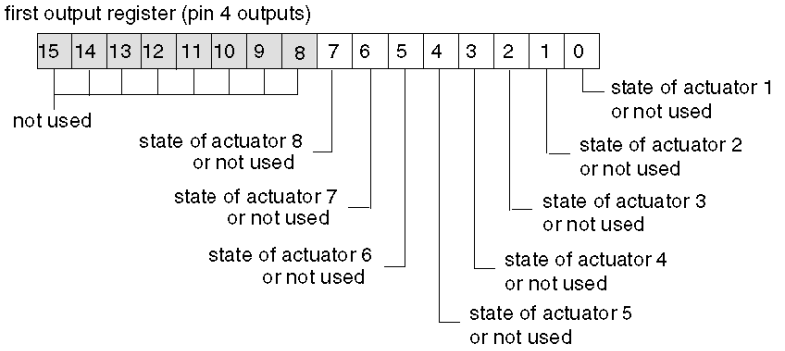

seventh input register (pin 4 warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 8 warning or not used
actuator 7 warning or not used
actuator 6 warning or not used
actuator 5 warning or not used
actuator 4 warning or not used
actuator 3 warning or not used
actuator 2 warning or not used
actuator 1 warning or not used

The eighth input register reports actuator warnings on pin 2 of each socket. When pin 2 of a socket is configured to support an input or a diagnostic, the associated bit in this register is not used. A returned bit value of 1 indicates a detected warning condition on the associated actuator output.


eighth input register (pin 2 warnings)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
actuator 16 warning or not used
actuator 15 warning or not used
actuator 14 warning or not used
actuator 13 warning or not used
actuator 12 warning or not used
actuator 11 warning or not used
actuator 10 warning or not used
actuator 9 warning or not used

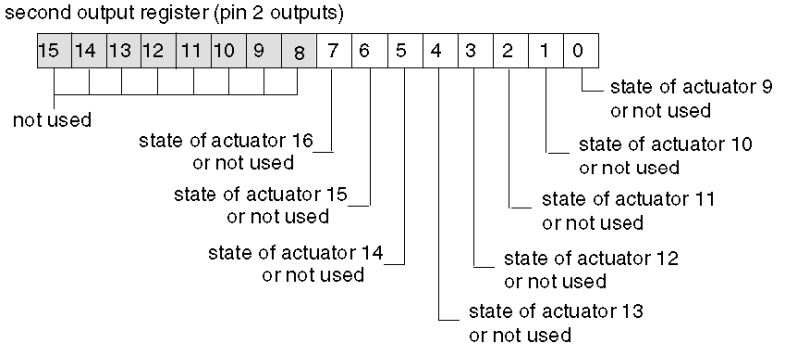
Output Registers

By default, the eight M12 round sockets on the splitter box support sensor inputs via pin 4. You may configure pin 4 on any of the channels to support outputs, in which case the state of the outputs is reported in the first register of the output process image used by the FTB 1CN16CM0. When pin 4 of is configured to support an input, the associated bit in this register is not used.


first output register (pin 4 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 8 or not used
state of actuator 7 or not used
state of actuator 6 or not used
state of actuator 5 or not used
state of actuator 4 or not used
state of actuator 3 or not used
state of actuator 2 or not used
state of actuator 1 or not used

Optionally, you may use the Advantys configuration software to reassign pin 2 on any or all of the sockets to support a sensor input or an actuator output. When pin 2 on a socket is configured for I/O, the input or output on pin 4 of that socket does not report diagnostics.

You may configure pin 2 on any of the channels to support outputs, in which case the state of the outputs is reported in the second register of the output process image used by the FTB 1CN16CM0. When pin 2 of is configured to support an input or a diagnostic, the associated bit in this register is not used.


second output register (pin 2 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
state of actuator 16 or not used
state of actuator 15 or not used
state of actuator 14 or not used
state of actuator 13 or not used
state of actuator 12 or not used
state of actuator 11 or not used
state of actuator 10 or not used
state of actuator 9 or not used

Parker Moduflex Valve System CANopen Module P2M2HBVC11600

3

Overview

This chapter describes the Parker Moduflex Valve System CANopen module P2M2HBVC11600.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Parker Moduflex P2M2HBVC11600 Overview	98
Parker Moduflex P2M2HBVC11600 Configuration	100
Parker Moduflex P2M2HBVC11600 Process Image	101

Parker Moduflex P2M2HBVC11600 Overview

Overview

Parker Moduflex Valve System provides flexible pneumatic automation. Depending on application, you can assemble short or long islands (up to 16 outputs). IP 65-67 water and dust protection allows the valve to be installed near the cylinders for shorter response time and lower air consumption.

The Parker Moduflex Valve System CANopen module (P2M2HBVC11600) can be used as an enhanced CANopen device in an Advantys STB island configuration. This implementation uses the CANopen connection of the P2M2HBVC11600 to communicate across the Advantys STB island, allowing the module to become a node on the Advantys STB island.

Use any standard Advantys STB NIM to control the P2M2HBVC11600. The module will operate on any open fieldbus supported by Advantys STB.

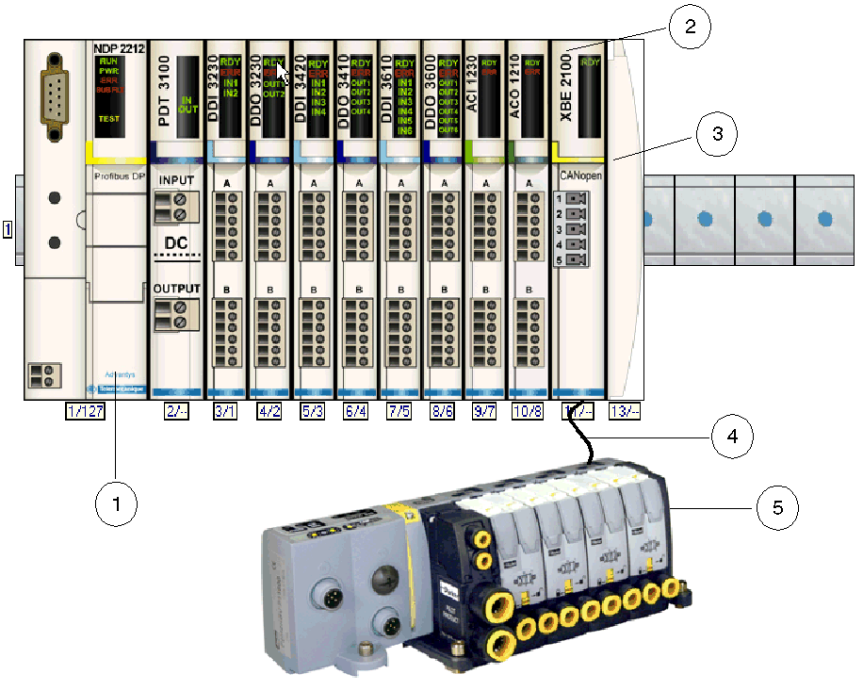
The firmware version of the P2M2HBVC11600 must be V 1.4 or later.

References

For detailed descriptions of P2M2HBVC11600 wiring, LED patterns, set-up procedures, and functionality, refer to user documentation provided by Parker.

Illustration

Using the Advantys configuration software, select a P2M2HBVC11600 Parker Moduflex module from the Enhanced CANopen section of the Catalog Browser. An image of the module appears connected to the end of the island bus, as displayed below.



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 P2M2HBVC11600 module

Functional Description

The fieldbus master sends 2 bytes to the P2M2HBVC11600 to control the outputs of up to 16 valves. The P2M2HBVC11600 sends 2 bytes to the fieldbus master, which contain the diagnostic information about the valves.

For additional information, see Parker Moduflex Process Image *(see page 101)*.

Parker Moduflex P2M2HBVC11600 Configuration

Overview

This topic describes the steps required to configure the P2M2HBVC11600 for operation in the Advantys STB system.

Configuring the P2M2HBVC11600

The P2M2HBVC11600 has 3 rotary switches to define the baud rate and set the node ID of the module on the STB island bus. The switch set-up procedure is defined in the Parker Moduflex user manual. The following table describes some of the important steps to help you configure the module as an enhanced CANopen device on an Advantys STB island.

Step	Action	Result
1	Turn off the operating voltage.	
2	Set the baud rate switch (labeled SPEED) to position AUTO.	The baud rate is set automatically to 500 kbaud when the module is connected to the Advantys STB island.
3	Set the node ID with the other 2 rotary switches.	The maximum allowable node ID setting is 32. Make sure that the address you set with these switches matches the address set in the Advantys configuration software for this module.

Parker Moduflex P2M2HBVC11600 Process Image

Output Data

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or the Advantys configuration software in online mode (if the island is in test mode).The P2M2HBVC11600 uses 2 registers in the output process image.

The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The P2M2HBVC11600 uses 2 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

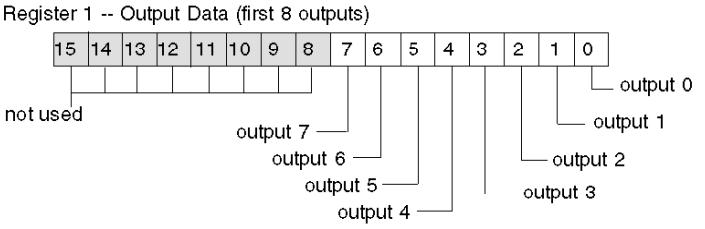
Input Data

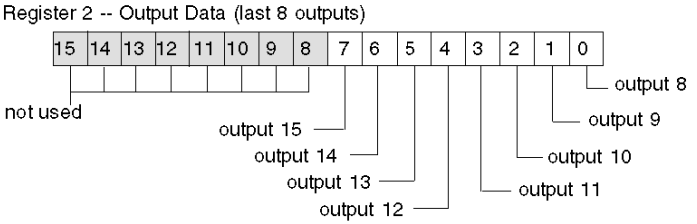
The P2M2HBVC11600 sends diagnostic data of the valves, which are attached to the module, to the island's NIM. The NIM stores the information in 2 contiguous 16-bit registers. This information can be read by the fieldbus master, an HMI panel connected to the NIM's CFG port, or the Advantys configuration software in online mode.

The NIM's input data process image is a reserved block of 4096 16-bit registers (in the range 45392 through 49487) that represents the data returned by the P2M2HBVC11600. Each input module on the island bus is represented in this data block. The P2M2HBVC11600 uses 2 contiguous registers in the input data block. Their specific positions in the process image are based on the module's node address on the island bus.

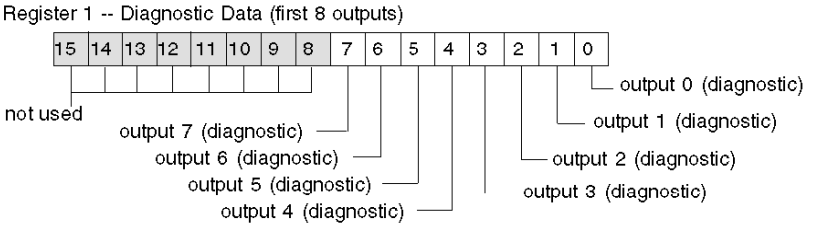
Consult the Parker Moduflex user manuals for more detail about each data word.

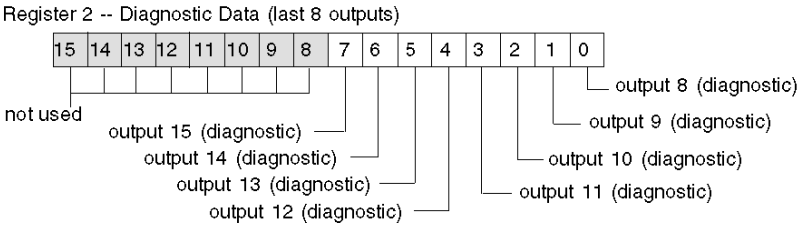
Output Process Image





Input Process Image


Register 1 -- Diagnostic Data (first 8 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
output 7 (diagnostic)
output 6 (diagnostic)
output 5 (diagnostic)
output 4 (diagnostic)
output 3 (diagnostic)
output 2 (diagnostic)
output 1 (diagnostic)
output 0 (diagnostic)


Register 2 -- Diagnostic Data (last 8 outputs)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
not used
output 15 (diagnostic)
output 14 (diagnostic)
output 13 (diagnostic)
output 12 (diagnostic)
output 11 (diagnostic)
output 10 (diagnostic)
output 9 (diagnostic)
output 8 (diagnostic)

XCC-351xxS84CB Absolute Rotary Encoder

4

About this Chapter

This chapter describes the Telemecanique XCC-351xxS84CB absolute rotary encoder as an enhanced CANopen device on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
XCC-351xxS84CB Absolute Rotary Encoder	104
XCC-351xxS84CB Encoder Configuration	106
Functional Description of the XCC-351xxS84CB Encoder	108
XCC-351xxS84CB Process Image	110

XCC-351xxS84CB Absolute Rotary Encoder

Overview

The Telemecanique XCC-351xxS84CB is a multi-turn absolute rotary encoder that reports the position of the rotating shaft to the NIM. This encoder is available as an enhanced CANopen device for any Advantys STB island configuration. In this capacity, the encoder's direct CANopen connection communicates across the Advantys STB island, allowing it to function as a node on the island.

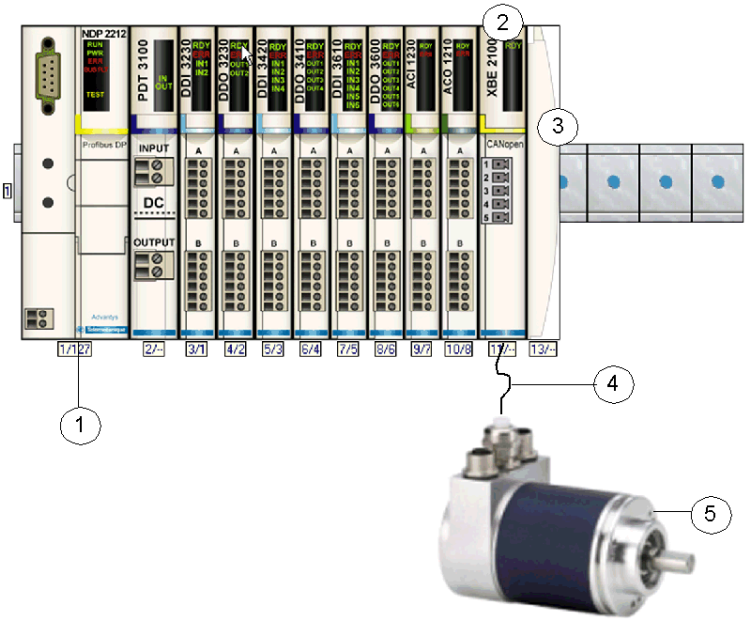
For any supported fieldbus, a standard Advantys STB NIM can control the XCC-351xxS84CB encoder. The encoder requires the following versions (or later) of the Advantys STB NIM firmware:

Fieldbus	Advantys Part Number	Minimum Version Number
INTERBUS	STBNIB2212	2.02
CANopen	STBNCO2212	2.02
Profibus	STBNDP2212	2.04
Fipio	STBNFP221	2.03
Ethernet	STBNIP221	2.1.4
DeviceNet	STBNDN2212	2.04
Modbus Plus	STBNMP2212	2.02

The firmware version of the XCC-351xxS84CB encoder must be 1.0 or later.

Connection

Using the Advantys configuration software, select an XCC-351xxS84CB encoder from the Enhanced CANopen section of the Catalog Browser. The new device appears, connected to the end of the island bus:



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 XCC-351xxS84CB encoder

NOTE: For detailed descriptions of XCC-351xxS84CB encoder wiring, LED patterns, set-up procedures, and functionality, refer to user documentation provided by Telemecanique (part number 1690023_02A55 01 01/2006).

XCC-351xxS84CB Encoder Configuration

Introduction

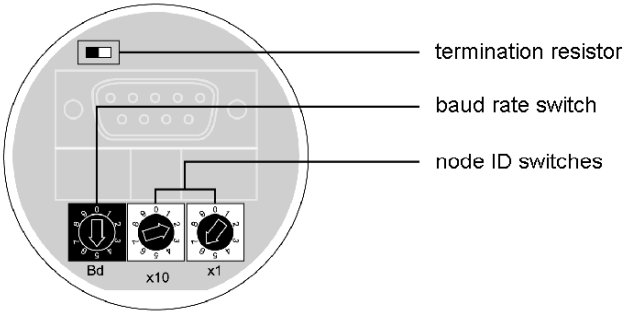
To use the XCC-351xxS84CB encoder as an enhanced CANopen device on an Advantys STB island, you have to set the appropriate:

- baud rate
- node ID

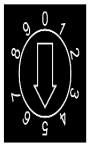
NOTE: The set-up procedures for the baud rate switch (Bd) and the node ID rotary switches are defined in the XCC-351xxS84CB user manual supplied by Telemecanique.

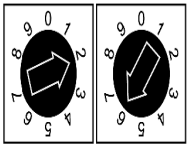
Configuration

Set the baud rate, island bus node ID, and bus termination with the encoder's rotary switches:



To configure the encoder as an enhanced CANopen device on an Advantys STB island:

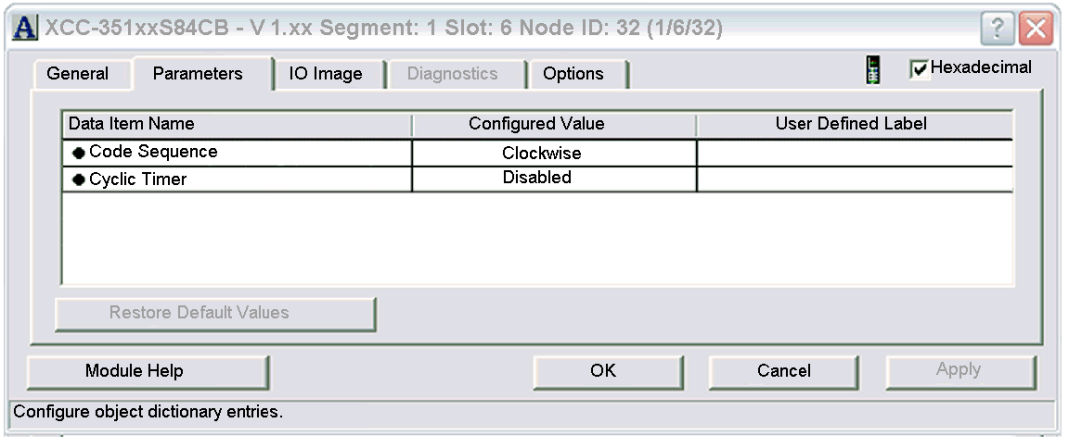
Step	Action	Comment
1	Turn off the operating voltage of the encoder.	
2	Unscrew the encoder base to access the encoder settings.	
3	Set the baud rate switch (Bd) to position 5: 	Position 5 sets the baud rate to 500 kbps, the required operating baud rate for an Advantys STB island with enhanced CANopen devices.

Step	Action	Comment
4	Set the node ID (1 to 32) with the other two rotary switches: 	The left switch represents the tens (x10) position and the right switch represents the ones (x1) position. Therefore, the switches in the figure represent a node ID of 26. The configured node ID must match the one set for the module in the Advantys configuration software.
5	Set the termination resistor with the DIP switch (Rt) in accordance with the encoder's physical position on the island bus: ● *on*: The encoder is the last device on the STB island. ● *off*: The encoder is in any other position on the STB island.	To ensure reliable operation, the island bus must be terminated using a termination resistor at the last device. The terminating resistor in the encoder is only required when it is the last device on the island bus.

Functional Description of the XCC-351xxS84CB Encoder

Overview

Open the XCC-351xxS84CB encoder in the Module Editor of the Advantys configuration software:



On the encoder's Parameters tab, you can configure:

- Code Sequence
- Cyclic Timer

Code Sequence

By default, the clockwise shaft rotation results in increased position value. By configuring the **Code Sequence** parameter, you can modify this behavior such that counter-clockwise rotation results in increased position value.

The following user-configurable code sequences are available:

- Clockwise
- Counter-clockwise

To configure the Code Sequence:

Step	Action	Result
1	Double-click on the XCC-351xxS84CB in the Advantys configuration software.	The selected module opens in the software module editor.
2	From the pull-down menu in the **Configured Value** column, select the desired setting from the **Code Sequence** row.	

Cyclic Timer

By default, the Advantys NIM automatically receives new data from the XCC-351xxS84CB encoder at update times that are automatically determined by the size of the island configuration. However, you may want to manually adjust the frequency of the data transmission from the encoder to the NIM by modifying the **Cyclic Timer** parameter in the Advantys configuration software:

Step	Action	Result
1	Double-click **XCC-351xxS84CB** in the Advantys configuration software.	The selected module opens in the software module editor.
2	From the pull-down menu in the **Configured Value** column of the **Cyclic Timer** row, select the desired update time.	Choose from: • Disabled • 20 ms • 50 ms • 100 ms • 250 ms • 500 ms • 1 sec

XCC-351xxS84CB Process Image

Input Data

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The XCC-351xxS84CB encoder reports the position of the rotating shaft to two contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

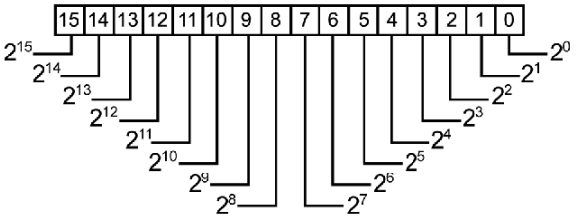
- the fieldbus master
- an HMI panel connected to the NIM's CFG port
- the Advantys configuration software in online mode

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. (Separate guides are available for each supported fieldbus.)

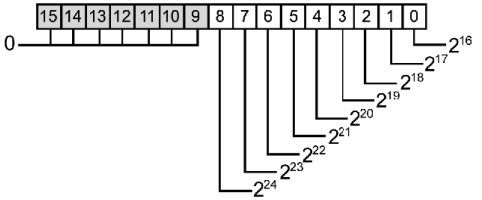
Position Value

The Position Value is a 32-bit unsigned integer value that represents the position of the encoder's shaft. In the NIM's input data process image, the least significant word is stored in the lower address and the most significant word is stored in the upper address.

Register 1 (lower word of the Position Value):



Register 2 (upper word of the Position Value):



NOTE: Consult the manuals provided by Telemecanique for additional details about the process image of the XCC-351xxS84CB encoder.

Balluff BTL5-H1 Encoder

5

About this Chapter

This chapter describes the Balluff BTL5-H1 linear encoder as an enhanced CANopen device on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Balluff BTL5-H1 Linear Encoder	112
BTL5-H1 Encoder Configuration	115
Functional Description of the BTL5-H1 Encoder	117
BTL5-H1 Process Image	120

Balluff BTL5-H1 Linear Encoder

Overview

The Balluff BTL5-H1 is a linear encoder that reports to the NIM the speed and position of the magnet along the waveguide. This encoder is available as an enhanced CANopen device for any Advantys STB island configuration. In this capacity, the encoder's direct CANopen connection communicates across the Advantys STB island, allowing it to function as a node on the island.

For any supported fieldbus, a standard Advantys STB NIM can control the BTL5-H1 encoder. The encoder requires the following versions (or later) of the Advantys STB NIM firmware:

Fieldbus	Advantys Part Number	Minimum Version Number
INTERBUS	STBNIB2212	2.04
CANopen	STBNCO2212	3.04
Profibus	STBNDP2212	2.05
Fipio	STBNFP221	2.04
Ethernet	STBNIP221	2.1.4
DeviceNet	STBNDN2212	2.05
Modbus Plus	STBNMP2212	2.04

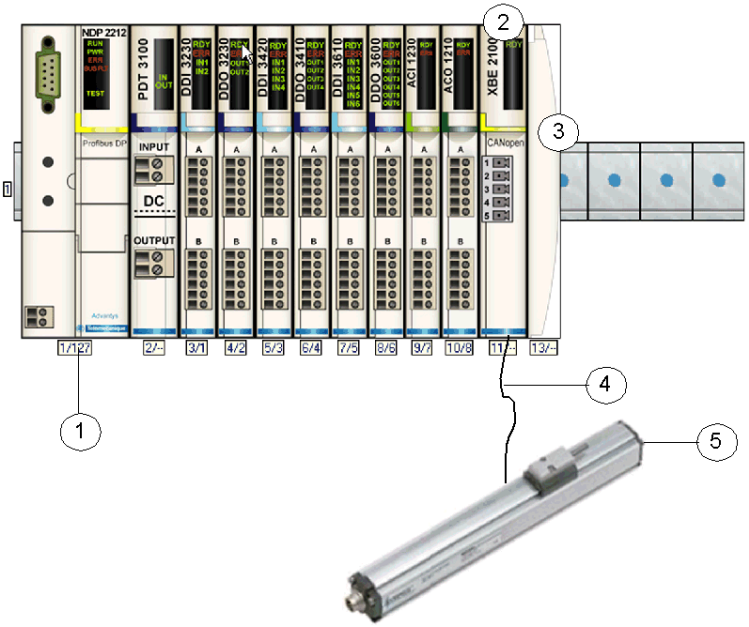
The firmware version of the BTL5-H1 encoder must be 4.02 or later.

When used as part of an island configuration, the BTL5-H1 encoder provides a fixed set of information about the position and velocity of the magnet. The process image identifies this information as:

- Position Value: represents the magnet position
- Speed Value: represents the magnet velocity

Connection

Using the Advantys configuration software, select a BTL5-H1 encoder from the Enhanced CANopen section of the Catalog Browser. The new device appears, connected to the end of the island bus:



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 BTL5-H1 encoder

NOTE: For detailed descriptions of BTL5-H1 encoder wiring, LED patterns, set-up procedures, and functionality, refer to user documentation provided by Balluff.

Resume Normal Operations

Following certain events, it may be necessary to power-cycle the BTL5-H1 encoder in order for it to become operational. Some of these events include:

- Stopped PLC operation.
- Fieldbus communication is lost (and the NIM is configured to detect the failure).
- NIM fails or power is removed from the NIM.
- The CAN cable between the BTL5-H1 encoder and the Advantys CANopen Extension module is disconnected.
- The cable between the EOS and BOS (if configured) is removed.

While the Advantys configuration software is in online mode, one of the following operations is performed:

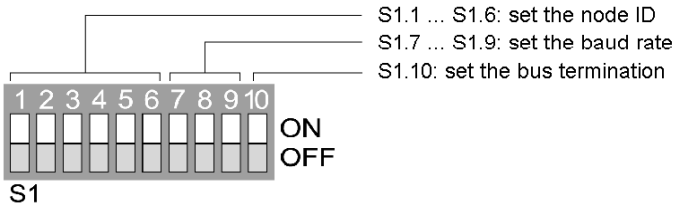
- download a new island configuration
- issue a Reset command
- issue a Store to SIM Card command
- issue a Protect command

NOTE: Powering up, hot swapping, or connecting the BTL5-H1, either alone or in conjunction with other modules, can increase the time it takes for those modules to become operational.

BTL5-H1 Encoder Configuration

Introduction

Configure the BTL5-H1 encoder with the 10-element DIP switch:



NOTE: The set-up procedure for the DIP switch is defined in the user manual supplied by Balluff.

Configuration

To configure the encoder as an enhanced CANopen device on an Advantys STB island:

Step	Action	Result
1	Turn off the operating voltage of the encoder.	
2	Take off the cover by removing the four screws.	
3	On the DIP switch, set switches 7 and 8 to ON and switch 9 to OFF.	This sets the baud rate to 500 kbps, the required operating baud rate for an Advantys STB island with enhanced CANopen devices. See About the Baud Rate *(see page 116)*.
4	Set the node ID (1 to 32) with switches 1 though 6 on the DIP switch.	The configured node ID must match the one set for this module in the Advantys configuration software. See About the Island Bus Node ID *(see page 116)*.
5	Set the termination resistor at DIP switch position 10 in accordance with the encoder's physical position on the island bus: • *ON*: The encoder is the last device on the STB island. • *OFF*: The encoder is in any other position on the STB island.	To ensure reliable operation, the island bus must be terminated using a termination resistor at the last device. The terminating resistor in the encoder is only required when it is the last device on the island bus.

About the Node ID

Use switches S1.1 ... S1.6 to set the node ID. The values for the switches are in the table:

S1.1	S1.2	S1.3	S1.4	S1.5	S1.6
2^0	2^1	2^2	2^3	2^4	2^5
LSB					MSB
1	2	4	8	16	32

For example, setting only switches S1.3 and S1.5 to ON assigns a node ID of 20 (4 + 16) to the encoder.

About the Baud Rate

The available baud rates for the encoder are in the table:

Set Value	Baud Rate (kbps)	Comment
1	1000	An enhanced CANopen device on an Advantys STB island requires an operating baud rate of 500 kbps. Therefore, only a set value of 3 is appropriate.
2	800	
3	500	
4	250	
5	125	
6	100	
7	50	

Use switches S1.7 ... S1.9 to set the baud rate. The values for the switches are in the table:

S1.7	S1.8	S1.9
2^0	2^1	2^2
LSB		MSB
1	2	4

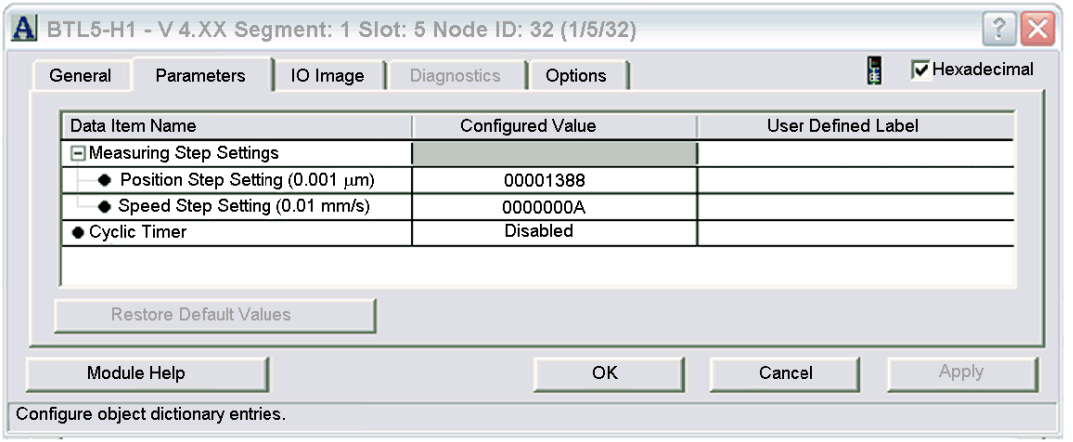
To set the appropriate baud rate of 500 kbps, you need a set value of 3 (1 + 2):

- S1.7: ON
- S1.8: ON
- S1.9: OFF

Functional Description of the BTL5-H1 Encoder

Overview

Open the BTL5-H1 encoder in the Module Editor of the Advantys configuration software:



On the encoder's Parameters tab, you can configure:

- Measuring Step Settings:
  - Position Step Setting
  - Speed Step Setting
- Cyclic Timer

Position Step Setting

By default, each 1-bit change in the Position Value in the process image represents a 5-µm position change. That is, each 5-µm change in magnet position results in a change of 1 count in the Position Value. You can modify the resolution so that each 1-bit change represents a different physical step. The range of this user-configurable value is 5 µm to 2.147483647 m.

The Position Step Setting is configurable as a decimal or hexadecimal value in the range of 5 000 to 2 147 483 647 (0x1388 to 0x7FFFFFFF). The actual resolution value is obtained by multiplying the value entered with the Advantys configuration software by 0.001 µm. For example, if a value of 10 000 is entered, the actual position resolution is 10 µm.

To configure the position step setting:

Step	Action	Result
1	Double-click **BTL5-H1** in the Advantys configuration software.	The selected module opens in the software module editor.
2	Expand the **Measuring Step Settings** field by clicking on the plus (**+**) sign.	Two rows appear below the field.
3	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	• unchecked: decimal • checked: hexadecimal
4	In the **Configured Value** field for the **Position Step Setting** row, enter the desired value.	The actual resolution is obtained by multiplying the entered value by 0.001 µm.

Speed Step Setting

The Speed Step Setting value is configurable as a decimal or hexadecimal value in the range of 10 to 2 147 483 647 (0xA to 0x7FFFFFFF). The actual speed resolution is obtained by multiplying the value entered in the Advantys configuration software by 0.01 mm/s. The default value of Speed Step Setting is 10 (0xA), meaning each 1-bit value in the Speed Value in the process image represents a speed of 0.1 mm/s. Thus, by default, the Speed Value represents the physical speed of the magnet divided by 0.1 mm/s.

For example, if a value of 1000 is entered in the **Configured Value** field, the actual speed resolution is 10 mm/s. Thus, if the magnet moves at 100 mm/s (or 1 m/s), then the corresponding **Speed Value** is 10.

To configure the speed step setting:

Step	Action	Result
1	Double-click **BTL5-H1** in the Advantys configuration software.	The selected module opens in the software module editor.
2	Expand the **Measuring Step Settings** field by clicking on the plus (**+**) sign.	Two rows appear below the field.
3	Choose the data display format by either checking or unchecking the **Hexadecimal** checkbox at the top right of the editor.	• unchecked: decimal • checked: hexadecimal
4	In the **Configured Value** field for the **Speed Step Setting** row, enter the desired value.	The actual speed resolution is obtained by multiplying the value entered by 0.01 mm/s.

Cyclic Timer

By default, the Advantys NIM receives new data from the BTL5-H1 encoder at update times that are automatically determined by the size of the island configuration. However, you may want to manually adjust the frequency of the data transmission from the encoder to the NIM by modifying the **Cyclic Timer** parameter in the Advantys configuration software:

Step	Action	Result
1	Double-click **BTL5-H1** in the Advantys configuration software.	The selected module opens in the software module editor.
2	From the pull-down menu in the **Configured Value** column of the **Cyclic Timer** row, select the desired update time.	Choose from: • Disabled • 20 ms • 50 ms • 100 ms • 250 ms • 500 ms • 1 sec

BTL5-H1 Process Image

Input Data

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The BTL5-H1 encoder sends the magnet's speed and position to 4 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

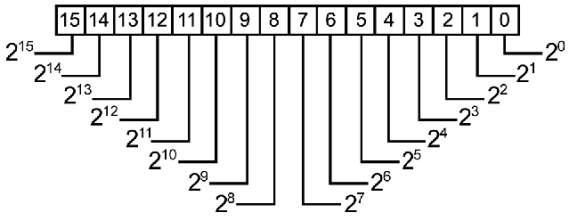
- the fieldbus master
- an HMI panel connected to the NIM's CFG port
- the Advantys configuration software in online mode

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

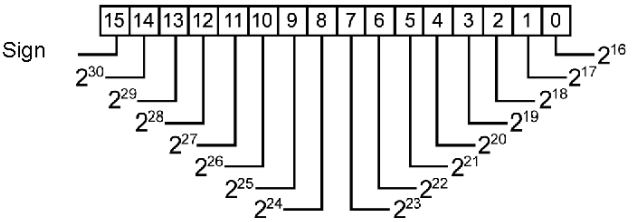
Position Value

The Position Value is a 32-bit integer value that represents the position of the magnet on the encoder. In the NIM's input data process image, the least significant word is stored in the lower address and the most significant word is stored in the upper address.

Register 1 (lower word of the Position Value):

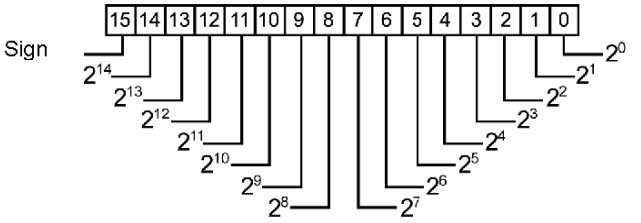


Register 2 (upper word of the Position Value):



Speed Value

The Speed Value is a 16-bit integer value that represents the speed of the magnet on the encoder:



Reserved

The Reserved field is an 8-bit value. It is currently not used.

NOTE: Consult the manuals provided by Balluff for additional details about the process image of the BTL5-H1 encoder.

Altivar 31 Variable Speed AC Drive

6

Overview

The following chapter describes the Telemecanique Altivar 31 (ATV31) variable speed AC drive.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
ATV31 Variable Speed AC Drive	124
ATV31 Configuration and Operation	127
ATV31 Process Image	134

ATV31 Variable Speed AC Drive

Overview

The ATV31 is a variable speed AC drive for 3-phase asynchronous motors. The ATV31 drive can be used as an enhanced CANopen device in an Advantys STB island configuration. This implementation uses the direct CANopen connection of the ATV31 drive to communicate across the Advantys STB island, allowing the drive to become a node on the Advantys STB island.

Use any standard Advantys STB NIM to control the drive. The ATV31 will operate on any open fieldbus supported by Advantys STB.

The ATV31 drive requires the use of any of the following - or later - versions of Advantys STB NIM firmware:

Fieldbus	Advantys Part Number	Minimum Version Number
INTERBUS	STBNIB2212	1.01
CANopen	STBNCO2212	1.07
Profibus	STBNDP2212	1.06
Fipio	STBNFP2212	1.03
Ethernet	STBNIP2212	1.16
DeviceNet	STBNDN2212	1.05
Modbus Plus	STBNMP2212	1.03

The firmware version of the ATV31 drive must be V1.2IE03 or later.

Up to 12 drives can be attached to each Advantys NIM if there is enough space in the NIM's data process image. For example, in the INTERBUS NIM (STBNIB2212), there is sufficient space in the data process image for a maximum of 7 drives. Also note that the CANopen NIM (STBNCO2212) is limited to a maximum of 7 drives, regardless of the size of the NIM's data process image.

When used as part of an island configuration, the ATV31 drive provides - both to and from the drive - a fixed set of information designed to provide simple yet flexible drive control. This information includes: Control Word, Nominal Speed Value, Status Word, and Actual Speed Value.

References

For detailed descriptions of ATV31 drive wiring, LED patterns, display codes, set-up procedures, and functionality, refer to user documentation provided by Telemecanique, including:

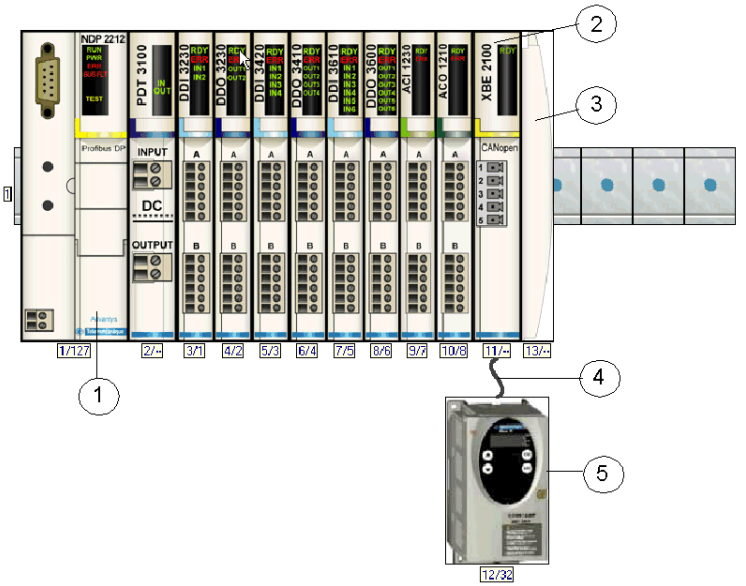
Document Name	Part Number
ATV31 CANopen Manual	VVDED303093
ATV31 Communication Variables	VVDED303092

Document Name	Part Number
ATV31 Modbus Manual	VVDED303091
ATV31 Programming Manual	VVDED303042
ATV31C Installation Manual	VVDED303101
ATV31H Installation Manual	VVDED303041
ATV31K Installation Manual	VVDED303121

NOTE: Be sure to read, understand, and follow the safety messages in the ATV31 user manuals.

Illustration

Using the Advantys configuration software, select an ATV31 drive from the Enhanced CANopen section of the Catalog Browser. An image of the drive appears connected to the end of the island bus, as displayed below.



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 ATV31 drive

Functional Description

Overview of Data Exchange While Drive is Operating

The fieldbus master sends 2 words to the drive:

- Command Word (e.g. Start / stop / reset drive fault)
- Nominal Speed Value

The drive sends 2 words to the fieldbus master, indicating:

- Drive Status
- Actual Speed Value

For additional information, see ATV31 Process Image *(see page 134)*.

Overview of Drive Configuration

You can configure the ATV31 drive using 1 or more of the following methods:

- the display and buttons on the ATV31 drive
- PowerSuite drive configuration software (version 2.0.0 or later)

You must configure the following 2 parameters:

- AdCO: CANopen node address. Set this parameter to the same value configured in the Advantys Configuration Software for this device.
- bdCO: baud rate. Set this parameter value to 500 kbps.

When configuring advanced ATV31 drive features, you may wish to use PowerSuite, an ATV31 drive configuration tool that provides many helpful features that help expedite the configuration process.

ATV31 Configuration and Operation

Overview

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

Before physically connecting the ATV31 drive to the Advantys STB island, use either the ATV31 drive's display and buttons or PowerSuite to verify that all drive parameters are set to their intended settings.

Parameters in the ATV31 drive may have been set to values different than the factory settings.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

This section describes:

- required steps for configuring the ATV31 drive for operation in the Advantys STB system
- features supported by the ATV31 drive
- limitations on the ATV31 drive

Configuring the ATV31 Drive

The following steps provide an overview of configuring the ATV31 drive for operation in the Advantys STB system. Several of these steps are described in greater detail elsewhere in this document, as noted.

Step	Action
1	Disconnect the ATV31 drive from any and all CAN connections.
2	Turn on power to the ATV31 drive.
3*	Optional: Restore the parameters in the drive to the factory settings *(see page 128)*.
4*	Set CANopen baud rate and node address *(see page 129)*.
5	Optional: Configure the other parameters using either the drive's display and buttons or PowerSuite.
6	Turn off power to the ATV31 drive.
7*	Use the Advantys configuration software to build a configuration that matches the physical configuration of the island, then download the configuration to the NIM *(see page 130)*.
8*	Write 0x0000 to the drive's Control Word *(see page 130)*in the NIM's output data process image to ensure that the drive (DRIVECOM) will be in *Switch on disabled* state.

Step	Action
9*	Connect the ATV31 drive to the Advantys CANopen Extension module *(see page 131)*.
10*	Turn on power *(see page 131)* to the ATV31 drive.
11*	Control the ATV31 drive by writing to Control Word *(see page 131)*.

* See detailed instructions for this step, below.

Step 3 Expanded

Step 3 - Optional: Restore the parameters in the drive to the factory settings.

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

When restoring drive parameters back to factory settings, use either the ATV31 drive's display and buttons or PowerSuite to verify the correctness of the parameters below.

Some parameters do not revert back to their factory settings.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before physically connecting the ATV31 drive to the Advantys STB island, use either the drive's display and buttons or PowerSuite to restore the drive parameters to the factory settings. If you do not perform this step, the drive will retain any previously configured parameter values, instead of the factory settings. Skip this step if you intend to retain the previously configured parameter values.

Menu settings described below may differ depending on the model of ATV31 and the settings of certain parameters. Consult the ATV31 programming manual (VVDED303042) for the complete setup procedure.

Step	Action	Result
3.1	Turn on power to the ATV31drive.	ATV31 powers on.
3.2	Press **ENT** to access the parameters menu.	ATV31 enters the parameters settings menu.
3.3	Scroll using up and down buttons until the display shows drC-. Then press **ENT** to access the menu.	ATV31 enters the motor control menu.
3.4	Scroll using up and down buttons until the display shows FCS. Then press **ENT** to access the parameter.	FCS parameter is used to return to factory settings / restore configuration.

Step	Action	Result
3.5	Scroll using up and down buttons until the display shows InI. Then press **ENT** for approximately two seconds. The display should blink once and then show No when the function has been completed.	InI entry is used to make the drive configuration identical to the factory settings.
3.6	Press **Esc** three times to exit the configuration mode.	ATV31 exits the parameter settings menu.

Note that the following parameters do not revert back to the factory settings even after performing the above procedure:

- Add
- AdCO
- BdCO
- bFr
- COd
- LCC
- tbr
- tFO
- ttO

Step 4 Expanded

Step 4 - Set CANopen baud rate and node address.

After restoring the factory settings, use either the ATV31 drive's display and buttons or PowerSuite to set the drive's baud rate (transmission speed) and node address (ID) on the Advantys STB island bus. Incorrectly configured baud rate and/or node address may result in an error condition which requires power cycling of the island. You must power cycle the drive for the newly configured baud rate and node address parameter values of the drive to take effect.

Step	Action	Result
4.1	Turn on power to the ATV31 drive.	ATV31 powers on.
4.2	Press **ENT** to access the parameters menu.	ATV31 enters the parameters settings menu.
4.3	Scroll using up and down buttons until the display shows CON-. Then press **ENT** to access the menu.	ATV31 enters the motor communication menu.
4.4	Scroll using up and down buttons until the display shows AdCO. Then press **ENT** to access the parameter. Note that the valid range is from 2 to 32. Make sure the address set here matches the address set in the Advantys configuration software for this device.	AdCO parameter is used to set the CANopen node address.

Step	Action	Result
4.5	Scroll using up and down buttons until the display shows the desired value of node address. Then press **ENT**.	CANopen node address is configured in the drive.
4.6	Press **Esc** to exit AdCO setting.	-
4.7	Scroll using up and down buttons until the display shows bdCO. Then press **ENT** to access the parameter.	bdCO parameter is used to set the CANopen baud rate.
4.8	Scroll using up and down buttons until the display shows 500.0. Then press **ENT**. Note that the baud rate must also be set to 500 kbps in the Advantys configuration software.	CANopen baud rate is configured in the drive.
4.9	Press **Esc** three times to exit the configuration mode.	ATV31 exits the parameter settings menu.
4.10	Power cycle the drive.	CANopen baud rate and node address take effect.

Step 7 Expanded

Step 7 - Build an island configuration with the Advantys configuration software.

Use the Advantys configuration software to build a configuration that matches the physical configuration of the island and download the configuration to the NIM.

Step 8 Expanded

Step 8 - Put the drive into Switch on disabled *state*.

⚠ WARNING

UNINTENDED MOTION

Before applying power to the drive, write 0x0000 to the drive's control word in the NIM's output data process image.

Turning power on to the drive with a non-zero value in its control word may result in motor rotation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To ensure the ATV31 drive is in *Switch on disabled* state when it powers on, write 0x0000 to its Control Word in the NIM's output data process image.

Step 9 Expanded

Step 9 - Physically connect the drive to the island.

Connect the ATV31 drive to the Advantys CANopen Extension module. CAN ground, CAN low bus signal, and CAN high bus signal must be connected between the Advantys CANopen Extension module and the ATV31 drive. Consult the ATV31 Modbus manual (VVDED303091) and the ATV31 CANopen manual (VVDED303093) for additional information on wiring requirements.

Step 10 Expanded

Step 10 - Turn on power to the drive attached to the island.

Turn on power to the ATV31 drive. To prevent the drive from experiencing motor phase loss fault (OPF), you may have to first connect a motor to the drive.

Step 11 Expanded

Step 11 - Control the drive attached to the island.

Control the drive by writing to Control Word. Refer to the ATV31 Communication Variables manual (VVDED303092) and the ATV31 Process Image *(see page 134)*.

Fallback Behavior

⚠ DANGER

UNINTENDED MOTION

Write 0x0000 to the drive's control word in the NIM's output data process image before performing any of the events described below.

Motor may continue to rotate following the events described below.

Failure to follow these instructions will result in death or serious injury.

Behavior of the ATV31 drive (and the motor attached to the drive) differs from that of the STB I/O modules when certain system events occur. The following table describes the behavior of the drive and motor.

Event	Behavior
• Fieldbus communications is lost (and NIM is configured to detect the failure). • NIM fails or power is removed from the NIM. • CAN cable between the ATV31 drive and the Advantys CANopen Extension module is disconnected. • Cable between the EOS and BOS (if configured) is removed.	Drive enters *Malfunction ATV faulty* state. Motor stops rotating.
Stop PLC operation.	Depends upon the configuration of the fieldbus and the fieldbus master.
While the Advantys configuration software is in online mode, one of the following operations is performed: • Download a new island configuration • Issue a Reset command • Issue a Store to SIM Card command	Drive and motor initially remain in the same state (e.g. motor continues to rotate at the same speed), eventually stopping only after the island has been re-initialized.*
While the Advantys configuration software is in online mode, a Stop command is issued.	Drive and motor remain in the same state (e.g. motor continues to rotate at same speed).*

* To stop the motor immediately, write 0x0000 to the drive's control word in the NIM's output data process image before performing any of the operations described above.

Error Indications

When errors occur in an ATV31 drive, they can be reported in a variety of ways. If the Advantys configuration software is online, errors will be reported in the Log Window and in the Diagnostics tab of the Module Editor. Errors may also be reported in the island data process image - both in the drive's Status Word and in the NIM's diagnostic data.

Depending on the nature of the error, the ATV31 drive may not automatically notify the NIM of the error-free status, even after all sources of the error have been cleared. In this case, you may need to perform one or more of the following actions to clear the error displayed in the Advantys configuration software and/or the island data process image (including the NIM's diagnostic data).

- If the island is still running and the malfunction bit (bit 3) in the ATV31's Status Word is set, write 0x0080 to the Control Word in the NIM's output data process image. If Status Word changes to 0x--40 and no errors are indicated in the NIM's diagnostic data, the error condition has been cleared.
- In the rare event the above procedure does not clear errors, issue a Reset command from the Advantys configuration software in online mode.

If the above steps do not clear all errors in both the ATV31 drive and the island, the root cause of the problem that resulted in ATV31 error(s) may not have been resolved. In this case, check both the physical setup and drive configuration to ensure that all elements of the system are set up correctly.

Unsupported and Non-Recommended Features

The following features are either unsupported or are not recommended when the drive is connected to the Advantys STB island.

- Remote terminal option of the ATV31 drive is not supported.
- Multi-motor configuration of the ATV31 drive is not supported.
- Do not use the mandatory module feature on any module in the island that includes an ATV31 drive. The ATV31 drive does not behave like Advantys STB I/O modules when a mandatory module fails or is removed and replaced.

ATV31 Process Image

Output Data

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software in online mode (if the island is in Test mode). The ATV31 drive uses 2 registers in the output process image.

The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The ATV31 drive uses 2 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Input Data

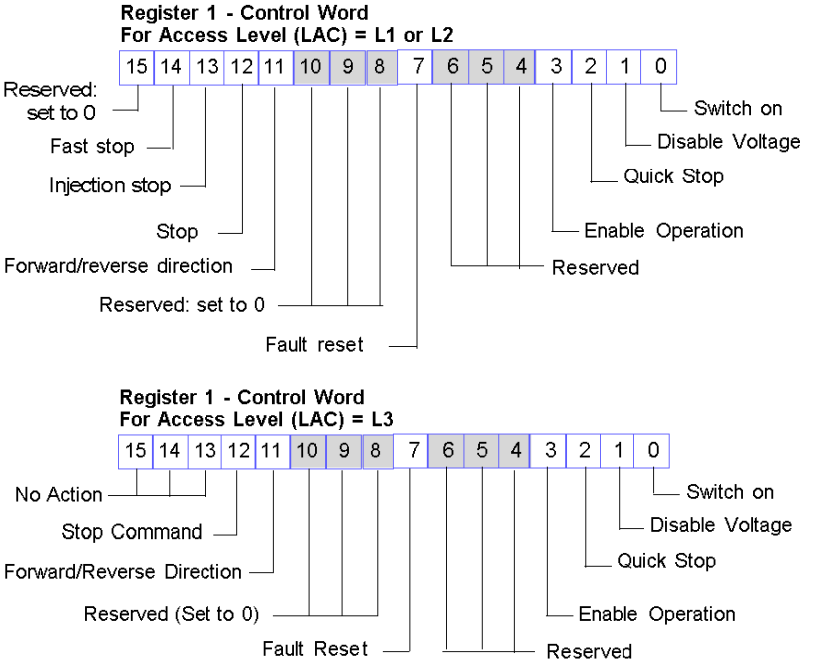
The ATV31 drive sends a representation of the operating state of the drive and the attached motor to the island's NIM. The NIM stores the information in 2 contiguous 16-bit registers. This information can be read by the fieldbus master, an HMI panel connected to the NIM's CFG port, or the Advantys configuration software in online mode.

The NIM's input data process image is a reserved block of 4096 16-bit registers (in the range 45392 to 49487) that represents the data returned by the ATV31 drive. Each input module on the island bus is represented in this data block. The ATV31 drive uses 2 contiguous registers in the input data block. Their specific positions in the process image are based on the module's node address on the island bus.

Consult the ATV31 CANopen manual (VVDED303093), the ATV31 Communication Variables manual (VVDED303092), and the ATV31 programming manual (VVDED303042) for more details about each data word.

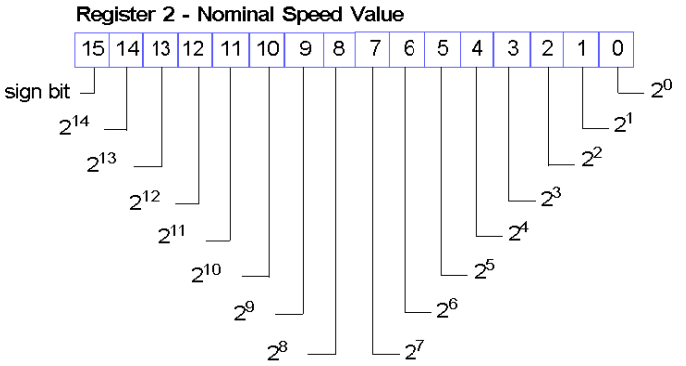
Output Process Image

Register 1 - Control Word



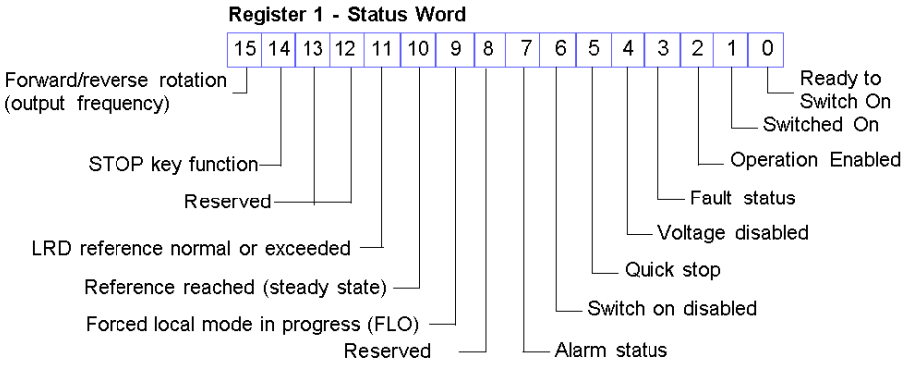
Register 2 - Nominal Speed Value

This 16-bit signed value represents the target velocity or nominal speed value of the drive in RPM.



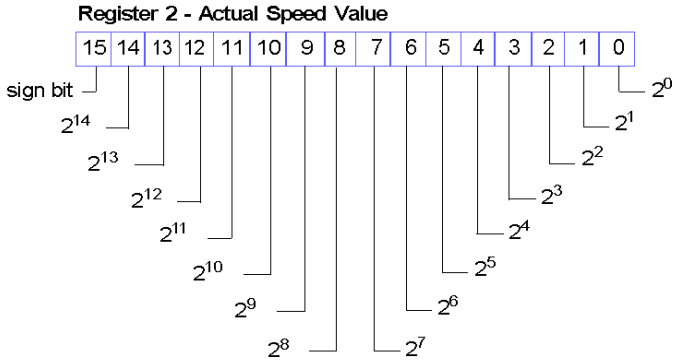
Input Process Image

Register 1 - Status word



Register 2 - Actual Speed Value

This 16-bit signed value represents the actual speed value of the drive in RPM.



Altivar 71 Variable Speed Drive

8

About this Chapter

This chapter describes the Telemecanique Altivar 71 (ATV71) variable speed drive as an enhanced CANopen device on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
ATV71 Overview	138
ATV71 Functional Description	141
ATV71 Configuration and Operation	142
ATV71 Process Image	148

ATV71 Overview

Introduction

The ATV71 variable speed drive is available as an enhanced CANopen device for any Advantys STB island configuration. In this capacity, the drive's direct CANopen connection communicates across the Advantys STB island, allowing it to function as a node on the island.

Use of this drive requires version 2.5 or greater of the Advantys configuration software.

For any supported fieldbus, a standard Advantys STB NIM can control the ATV71. The drive requires the following versions (or later) of the Advantys STB NIM firmware:

Fieldbus	Advantys Part Number	Minimum Version Number
INTERBUS	STBNIB2212	1.01
CANopen	STBNCO2212	1.08
Profibus	STBNDP2212	1.06
Fipio	STBNFP221	1.03
Ethernet	STBNIP221	1.16
DeviceNet	STBNDN2212	1.05
Modbus Plus	STBNMP2212	1.03

The firmware version of the ATV71 drive must be V1.2 IE12 or later.

You can attach up to 12 drives to each Advantys NIM if there is enough space in the NIM's data process image. For example, the data process image of the INTERBUS NIM (STBNIB2212) has enough space for a maximum of seven drives.

NOTE: The CANopen NIM (STBNCO2212) is limited to a maximum of seven drives regardless of the size of the NIM's data process image.

When used as part of an island configuration, the ATV71 drive provides a fixed set of information for simple yet flexible drive control (to and from the drive). This information includes:

- Control Word
- Speed Target
- Status Word
- Output Speed

References

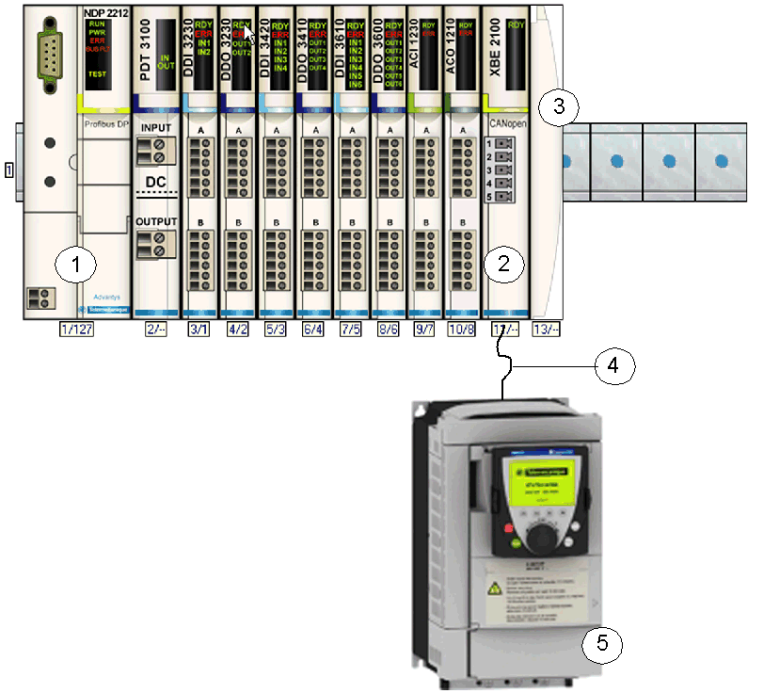
For detailed descriptions of ATV71 drive wiring, LED patterns, display codes, set-up procedures, and functionality, refer to user documentation provided by Telemecanique, including:

Document Name	Part Number
ATV71 (0.37-45 kW/200-240 V) (0.75-75 kW/380-480 V) Installation Manual	1755843
ATV71 (55-75 kW/200-240 V) (90-500 kW/380-480 V) Installation Manual	1755849
Altivar 71P Simplified Manual	1765101
Altivar 71 Programming Manual	1755855
Altivar 71 Communication Parameters	1755861
Altivar 61/71 CANopen User's Manual	1755865

NOTE: Be sure to read, understand, and follow the safety messages in the ATV71 user manuals.

Connection

Using the Advantys configuration software, select an ATV71 drive from the Enhanced CANopen section of the Catalog Browser. The new device appears, connected to the end of the island bus:



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 ATV71 drive

ATV71 Functional Description

Introduction

This topic discusses the functional description of the ATV71 drive.

Data Exchange During Drive Operation

These characteristics of data exchange are true during drive operation:

- The fieldbus master sends two words to the drive:
  - Control Word (for example, start/stop/reset drive fault)
  - Speed Target (rpm)
- The drive sends 2 words to the fieldbus master, indicating:
  - Status Word
  - Output Speed (rpm)

For additional information, see ATV71 Process Image *(see page 148)*.

Drive Configuration Overview

You can configure the ATV71 drive using one of these methods:

- graphic display terminal
- integrated display terminal (low-power drives only) (See the catalog.)
- PowerSuite drive configuration software

To use the drive in an Advantys STB island, you must configure at least these two parameters:

- AdCO (the CANopen node address): Set this parameter to the same value configured in the Advantys configuration software for this device.
- bdCO (baud rate): Set this parameter value to 500 kbps.

When configuring advanced ATV71 drive features, you may wish to use the graphic display terminal or PowerSuite, both of which provide many features that expedite the configuration process.

ATV71 Configuration and Operation

Safety Message

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

Before physically connecting the ATV71 drive to the Advantys STB island, use either the ATV71 drive's display terminal or PowerSuite to verify that all drive parameters are configured to their intended settings.

Parameters in the ATV71 drive may have been set to values different than the factory settings.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Configuration

Follow these steps to configure the ATV71 drive for operation in the Advantys STB system:

Step	Action	Comment
1	Disconnect the ATV71 drive from all CAN connections.	
2	Apply power to the control card of the ATV71 drive.	
3	Restore the parameters in the drive to the factory settings.	This step is optional. (You may want to keep the current drive parameters.) Refer to Step 3 Expanded *(see page 143)*.
4	Set the CANopen baud rate and node address.	Refer to Step 4 Expanded *(see page 144)*.
5	Configure the drive to use command and reference from the CANopen interface.	Refer to Step 5 Expanded *(see page 145)*.
6	Configure other parameters using either the drive's display terminal or PowerSuite.	This step is optional. (You may want to keep the current drive parameters.)
7	Turn off control power to the ATV71 drive.	
8	Build an island configuration with the Advantys configuration software.	Use the Advantys configuration software to build a configuration that matches the physical configuration of the island and download the configuration to the NIM.
9	Write `0x0000` to the drive's Control Word in the NIM's output data process image to ensure that the drive will be in **Switch on disabled** state (Drivecom profile).	

Step	Action	Comment
10	Connect power cables and wiring as needed.	Connect power cables and logic wires to match the operation of the configured drive. For wiring requirements, see the ATV71 reference documents *(see page 139)*.
11	Physically connect the ATV71 drive to the island via the Advantys CANopen Extension module.	CAN ground, CAN low bus signal, and CAN high bus signal must be connected between the Advantys CANopen Extension module and the ATV71 drive. For additional information on CAN wiring requirements, see the ATV71 reference documents *(see page 139)*.
12	Apply power to the ATV71 drive.	
13	Control the ATV71 drive by writing to the **Control Word**.	Control the drive attached to the island by writing to the Control Word. Refer to the ATV71 reference manuals *(see page 139)* and the discussion of the ATV71 Process Image *(see page 148)*.

Step 3 Expanded

Step 3 — Restore Drive Parameters to Factory Settings

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

When restoring drive parameters to the factory settings, use either the ATV71 drive's display terminal or PowerSuite to verify the validity of the parameters below.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before physically connecting the ATV71 drive to the Advantys STB island, use either the drive's display terminal or PowerSuite to restore the drive parameters to the factory settings. If you do not do this, the drive retains any previously configured parameter values instead of factory settings. Skip this step only if you intend to retain the previously configured parameter values.

The steps described below concern only the graphic display terminal. If you wish to use the integrated display terminal or PowerSuite to perform this task, consult the ATV71 reference manuals *(see page 139)*:

Step	Action	Comment
3.1	Apply power to the control card of the ATV71 drive.	The ATV71 powers on.
3.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
3.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV71 drive configuration menu appears.

Step	Action	Comment
3.4	Select **1.12 FACTORY SETTINGS** and press **ENT**.	You can restore selected parameters to their factory settings.
3.5	Select **PARAMETER GROUP LIST** and press **ENT**.	Different groups of parameters can be restored to the factory settings.
3.6	Select the group of parameters to set to the factory default values and press **ENT**.	A checkmark is placed next to the selection.
3.7	Press **ESC** once to return to **1.12 FACTORY SETTINGS** menu.	
3.8	Select **Goto FACTORY SETTINGS** and press **ENT**.	Read the warning message.
3.9	Press **ENT** to restore factory settings of the parameters you selected.	The selected parameter group is restored to its factory settings.
3.10	Press **ESC** three times to exit the configuration mode.	ATV71 exits the configuration mode.

Step 4 Expanded

Step 4 — Set CANopen Baud Rate and Node Address

After restoring the factory settings, use either the drive's display terminal or PowerSuite to set the drive's baud rate and node address (ID) on the Advantys STB island bus. An incorrectly configured baud rate or node address can result in an error condition that requires you to power cycle the island. The drive's newly configured baud rate and node address parameter values take effect only after you cycle the power to the drive.

To set the baud rate and node ID:

Step	Action	Comment
4.1	Apply power to the control card of the ATV71 drive.	The ATV71 powers on.
4.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
4.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV71 drive configuration menu appears.
4.4	Select **1.9 COMMUNICATION** and press **ENT**.	You can configure various communication parameters.
4.5	Select **CANopen** and press **ENT**.	You can configure CANopen node address and baud rate.
4.6	Select **CANopen address** (valid range: 1 to 32) and press **ENT**.	Make sure the address set here matches the address set in the Advantys configuration software for this device.
4.7	Select the desired value of node address and press **ENT**.	The CANopen node address is configured in the drive.
4.8	Select the **CANopen bit rate** and press **ENT**.	

Step	Action	Comment
4.9	Select **500 kbps** and press **ENT**. Note that the baud rate must also be set to 500 kbps in the Advantys configuration software.	The CANopen baud rate is configured in the drive.
4.10	Press **ESC** four times to exit the configuration mode.	The ATV71 exits the configuration mode.
4.11	Cycle the drive power.	The CANopen baud rate and node address take effect.

Step 5 Expanded

Step 5 — Configure the Drive to Use Command and Reference from the CANopen Interface

Follow these steps:

Step	Action	Comment
5.1	Apply power to the control card of the ATV71 drive.	The ATV71 powers on.
5.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
5.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV71 drive configuration menu appears.
5.4	Select **1.6 COMMAND** and press **ENT**.	You can modify the reference channel configuration.
5.5	Select **Ref.1 channel** and press **ENT**.	Reference channel 1 is used for drive application functions.
5.6	Select **CANopen** and press **ENT**.	The CANopen interface is selected as reference channel 1.
5.7	Select **Profile** and press **ENT**.	Choose whether command and reference come from the same channel.
5.8	Select **Not separ.** and press **ENT**.	The ATV71 is configured to use command and reference from the same channel.
5.9	Press **ESC** three times to exit the configuration mode.	ATV71 exits the configuration mode.

Fallback Behavior

When communications are lost between the drive and the fieldbus master, the drive and the motor attached to the drive go to a known state known as the fallback state. The behaviors of the drive and the motor differ depending on the cause of the communication loss.

The following behaviors apply when the default settings are used for the fallback parameters:

Event	Behavior
• Fieldbus communication is lost (and the NIM is configured to detect the failure). • The NIM fails or power is removed from the NIM. • The CAN cable between the ATV71 drive and the Advantys CANopen Extension module is disconnected. • The cable between the EOS and BOS (if configured) is removed.	The drive enters the Fault state. The motor stops rotating.
While the Advantys configuration software is in online mode, one of the following operations is performed: • download a new island configuration • issue a **Reset** command • issue a **Store to SIM Card** command • issue a **Protect** command • issue a **Stop** command	The drive enters Fault state. The motor stops rotating.
Stop PLC operation.	Depends upon the configuration of the fieldbus and the fieldbus master.

Error Reporting

When errors occur in an ATV71 drive, they can be reported in a variety of ways. If the Advantys configuration software is online, errors will be reported in the Log Window and in the Diagnostics tab of the Module Editor. Errors may also be reported in the island data process image in:

- the drive's Status Word
- the NIM's diagnostic data

Depending on the nature of the error, the ATV71 drive may not automatically notify the NIM of the error-free status, even after all sources of the error have been cleared. In this case, you may need to perform one or more of the following actions to clear the error displayed in the Advantys configuration software or the island data process image (including the NIM's diagnostic data):

- If the island is running and bit 3 (Fault bit) in the ATV71 Status Word is set, write 0x0080 to the Control Word in the NIM's output data process image. If the Status Word changes to 0x--40 or 0x--50 and no errors are indicated in the NIM's diagnostic data, the error condition has been cleared.
- In the rare event that the above procedure does not clear errors, issue a Reset command from the Advantys configuration software in online mode.
- If the above steps do not clear all errors in both the ATV71 drive and the island, the root cause of the problem that resulted in ATV71 error(s) may not have been resolved. In this case, check both the physical setup and drive configuration to ensure that all elements of the system are set up correctly.

ATV71 Process Image

Introduction

This topic discusses the input and output data process image for the ATV71 drive.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input Data

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The ATV71 drive sends a representation of the operating state of the drive and the attached motor to the island's NIM. The NIM stores the information in two contiguous 16-bit registers. (The specific positions of the registers in the process image are based on the module's node address on the island bus.) The input data process image can be read by:

- the fieldbus master
- an HMI panel connected to the NIM's CFG port
- the Advantys configuration software in online mode

For more information about each data word in the process image, see:

- ATV61/71 CANopen User's Manual (1755865)
- Altivar 71 Communication Parameters (1755861)
- Altivar 71 Programming Manual (1755855)

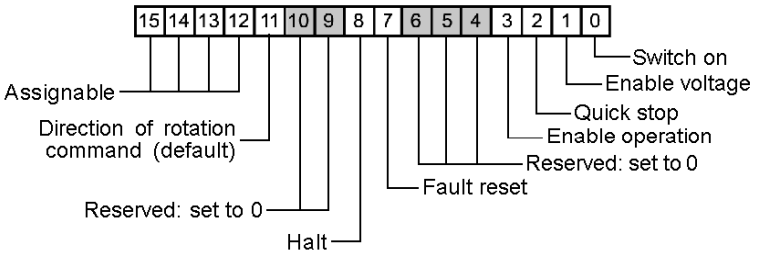
Output Data

The NIM keeps a record of output data in one block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software in online mode (if the island is in Test mode). The ATV71 drive uses two registers in the output process image.

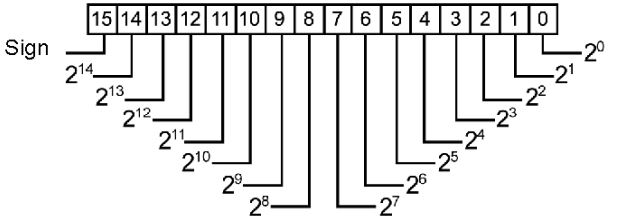
The NIM's output data process image is a reserved block of 4096 (16-bit) registers in the range 40001 to 44096 that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The ATV71 drive uses two contiguous registers in the output data block. (The specific positions of the registers in the process image are based on the module's node address on the island bus.)

Output Process Image

Register 1 — Control Word

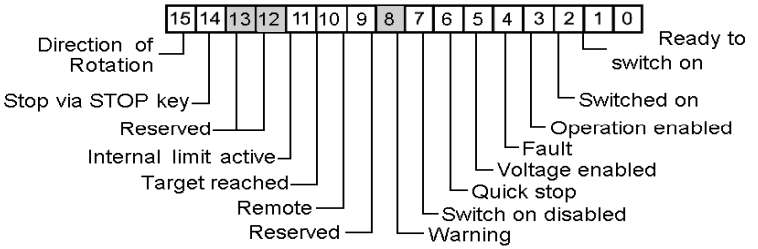


Register 2 — Speed Target. This 16-bit integer value represents the target velocity of the drive (RPM):

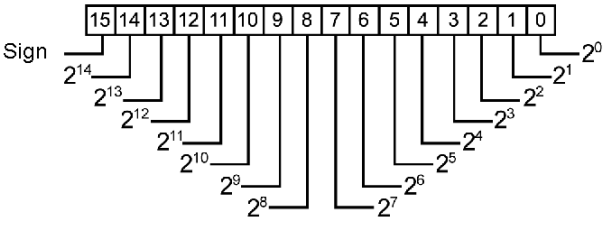


Input Process Image

Register 1 — Status Word



Register 2 — Output Speed . This 16-bit integer value represents the actual velocity of the drive (RPM):



Altivar 61 Variable Speed Drive

7

About this Chapter

This chapter describes the Telemecanique Altivar 61 (ATV61) variable speed drive as an enhanced CANopen device on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
ATV61 Overview	152
ATV61 Functional Description	155
ATV61 Configuration and Operation	156
ATV61 Process Image	162

ATV61 Overview

Introduction

The ATV61 variable speed drive is available as an enhanced CANopen device for any Advantys STB island configuration. In this capacity, the drive's direct CANopen connection communicates across the Advantys STB island, allowing it to function as a node on the island.

Use of this drive requires version 2.5 or greater of the Advantys configuration software.

For any supported fieldbus, a standard Advantys STB NIM can control the ATV61. The drive requires the following versions (or later) of the Advantys STB NIM firmware:

Fieldbus	Advantys Part Number	Minimum Version Number
INTERBUS	STBNIB2212	1.01
CANopen	STBNCO2212	1.08
Profibus	STBNDP2212	1.06
Fipio	STBNFP221	1.03
Ethernet	STBNIP221	1.16
DeviceNet	STBNDN2212	1.05
Modbus Plus	STBNMP2212	1.03

The firmware version of the ATV61 drive must be V1.4 IE08 or later.

You can attach up to 12 drives to each Advantys NIM if there is enough space in the NIM's data process image. For example, the data process image of the INTERBUS NIM (STBNIB2212) has enough space for a maximum of seven drives.

NOTE: The CANopen NIM (STBNCO2212) is limited to a maximum of seven drives regardless of the size of the NIM's data process image.

When used as part of an island configuration, the ATV61 drive provides a fixed set of information for simple yet flexible drive control (to and from the drive). This information includes:

- Control Word
- Speed Target
- Status Word
- Output Speed

References

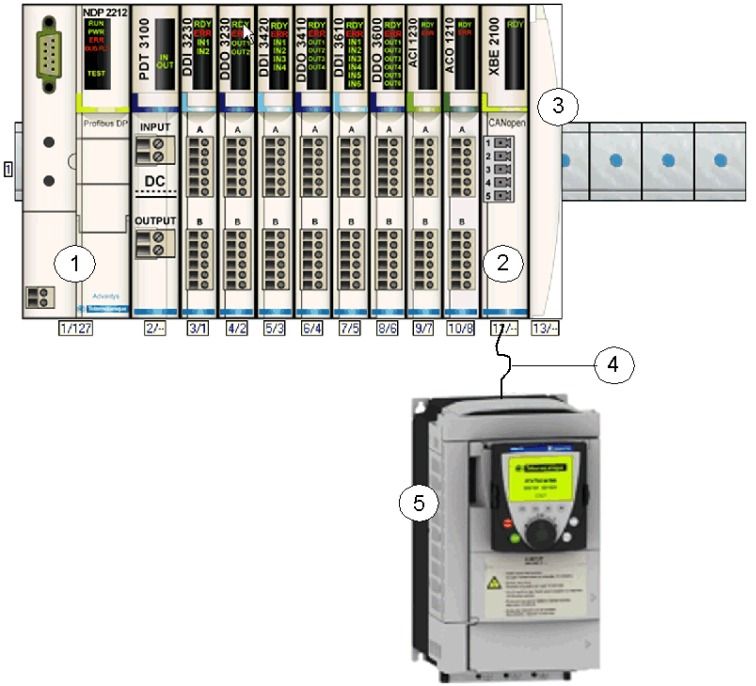
For detailed descriptions of ATV61 drive wiring, LED patterns, display codes, set-up procedures, and functionality, refer to user documentation provided by Telemecanique, including:

Document Name	Part Number
ATV61H (0.37–45 kW/200–240 V) (0.75-75 kW/380–400 V) Installation Manual	1760643
ATV61H (55–90 kW/200–240 V) (90-630 kW/380–400 V) Installation Manual	1760655
ATV61 Programming Manual	1760649
ATV61 Communication Parameters Manual	1760661
Altivar 61/71 CANopen User's Manual	1755865

NOTE: Be sure to read, understand, and follow the safety messages in the ATV61 user manuals.

Connection

Using the Advantys configuration software, select an ATV61 drive from the Enhanced CANopen section of the Catalog Browser. The new device appears, connected to the end of the island bus:



1 network interface module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 ATV61 drive

ATV61 Functional Description

Introduction

This topic discusses the functional description of the ATV61 drive.

Data Exchange During Drive Operation

These characteristics of data exchange are true during drive operation:

- The fieldbus master sends two words to the drive:
  - Control Word (for example, start/stop/reset drive fault)
  - Speed Target (rpm)
- The drive sends 2 words to the fieldbus master, indicating:
  - Status Word
  - Output Speed (rpm)

For additional information, see ATV61 Process Image *(see page 162)*.

Drive Configuration Overview

You can configure the ATV61 drive using one of these methods:

- graphic display terminal
- integrated display terminal (low-power drives only) (See the catalog.)
- PowerSuite drive configuration software

To use the drive in an Advantys STB island, you must configure at least these two parameters:

- AdCO (the CANopen node address): Set this parameter to the same value configured in the Advantys Configuration Software for this device.
- bdCO (baud rate): Set this parameter value to 500 kbps.

When configuring advanced ATV61 drive features, you may wish to use the graphic display terminal or PowerSuite, both of which provide many features that expedite the configuration process.

ATV61 Configuration and Operation

Safety Message

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

Before physically connecting the ATV61 drive to the Advantys STB island, use either the ATV61 drive's display terminal or PowerSuite to verify that all drive parameters are configured to their intended settings.

Parameters in the ATV61 drive may have been set to values different than the factory settings.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Configuration

Follow these steps to configure the ATV61 drive for operation in the Advantys STB system:

Step	Action	Comment
1	Disconnect the ATV61 drive from all CAN connections.	
2	Apply power to the control card of the ATV61 drive.	
3	Restore the parameters in the drive to the factory settings.	This step is optional. (You may want to keep the current drive parameters.) Refer to Step 3 Expanded *(see page 157)*.
4	Set the CANopen baud rate and node address.	Refer to Step 4 Expanded *(see page 158)*.
5	Configure the drive to use command and reference from the CANopen interface.	Refer to Step 5 Expanded *(see page 159)*.
6	Configure other parameters using either the drive's display terminal or PowerSuite.	This step is optional. (You may want to keep the current drive parameters.)
7	Turn off control power to the ATV61 drive.	
8	Build an island configuration with the Advantys configuration software.	Use the Advantys configuration software to build a configuration that matches the physical configuration of the island and download the configuration to the NIM.
9	Write `0x0000` to the drive's Control Word in the NIM's output data process image to ensure that the drive will be in **Switch on disabled** state (Drivecom profile).	

Step	Action	Comment
10	Connect power cables and wiring as needed.	Connect power cables and logic wires to match the operation of the configured drive. For wiring requirements, see the ATV61 reference documents *(see page 153)*.
11	Physically connect the ATV61 drive to the island via the Advantys CANopen Extension module.	CAN ground, CAN low bus signal, and CAN high bus signal must be connected between the Advantys CANopen Extension module and the ATV61 drive. For additional information on CAN wiring requirements, see the ATV61 reference documents *(see page 153)*.
12	Apply power to the ATV61 drive.	
13	Control the ATV61 drive by writing to the **Control Word**.	Control the drive attached to the island by writing to the Control Word. Refer to the ATV61 reference manuals *(see page 153)* and the discussion of the ATV61 Process Image *(see page 162)*.

Step 3 Expanded

Step 3 — Restore Drive Parameters to Factory Settings

⚠ WARNING

UNINTENDED CONFIGURATION AND OPERATION OF THE DRIVE

When restoring drive parameters to the factory settings, use either the ATV61 drive's display terminal or PowerSuite to verify the validity of the parameters below.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before physically connecting the ATV61 drive to the Advantys STB island, use either the drive's display terminal or PowerSuite to restore the drive parameters to the factory settings. If you do not do this, the drive retains any previously configured parameter values instead of factory settings. Skip this step only if you intend to retain the previously configured parameter values.

The steps described below concern only the graphic display terminal. If you wish to use the integrated display terminal or PowerSuite to perform this task, consult the ATV61 reference manuals *(see page 153)*:

Step	Action	Comment
3.1	Apply power to the control card of the ATV61 drive.	The ATV61 powers on.
3.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
3.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV61 drive configuration menu appears.

Step	Action	Comment
3.4	Select **1.12 FACTORY SETTINGS** and press **ENT**.	You can restore selected parameters to their factory settings.
3.5	Select **PARAMETER GROUP LIST** and press **ENT**.	Different groups of parameters can be restored to the factory settings.
3.6	Select the group of parameters to set to the factory default values and press **ENT**.	A checkmark is placed next to the selection.
3.7	Press **ESC** once to return to **1.12 FACTORY SETTINGS** menu.	
3.8	Select **Goto FACTORY SETTINGS** and press **ENT**.	Read the warning message.
3.9	Press **ENT** to restore factory settings of the parameters you selected.	The selected parameter group is restored to its factory settings.
3.10	Press **ESC** three times to exit the configuration mode.	ATV61 exits the configuration mode.

Step 4 Expanded

Step 4 — Set CANopen Baud Rate and Node Address

After restoring the factory settings, use either the drive's display terminal or PowerSuite to set the drive's baud rate and node address (ID) on the Advantys STB island bus. An incorrectly configured baud rate or node address can result in an error condition that requires you to power cycle the island. The drive's newly configured baud rate and node address parameter values take effect only after you cycle the power to the drive.

To set the baud rate and node ID:

Step	Action	Comment
4.1	Apply power to the control card of the ATV61 drive.	The ATV61 powers on.
4.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
4.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV61 drive configuration menu appears.
4.4	Select **1.9 COMMUNICATION** and press **ENT**.	You can configure various communication parameters.
4.5	Select **CANopen** and press **ENT**.	You can configure CANopen node address and baud rate.
4.6	Select **CANopen address** (valid range: 1 to 32) and press **ENT**.	Make sure the address set here matches the address set in the Advantys configuration software for this device.
4.7	Select the desired value of node address and press **ENT**.	The CANopen node address is configured in the drive.
4.8	Select the **CANopen bit rate** and press **ENT**.	

Step	Action	Comment
4.9	Select **500 kbps** and press **ENT**. Note that the baud rate must also be set to 500 kbps in the Advantys configuration software.	The CANopen baud rate is configured in the drive.
4.10	Press **ESC** four times to exit the configuration mode.	The ATV61 exits the configuration mode.
4.11	Cycle the drive power.	The CANopen baud rate and node address take effect.

Step 5 Expanded

Step 5 — Configure the Drive to Use Command and Reference from the CANopen Interface

Follow these steps:

Step	Action	Comment
5.1	Apply power to the control card of the ATV61 drive.	The ATV61 powers on.
5.2	Press **ENT** to access **MAIN MENU**.	The **MAIN MENU** appears.
5.3	Select **1 DRIVE MENU** and press **ENT**.	The ATV61 drive configuration menu appears.
5.4	Select **1.6 COMMAND** and press **ENT**.	You can modify the reference channel configuration.
5.5	Select **Ref.1 channel** and press **ENT**.	Reference channel 1 is used for drive application functions.
5.6	Select **CANopen** and press **ENT**.	The CANopen interface is selected as reference channel 1.
5.7	Select **Profile** and press **ENT**.	Choose whether command and reference come from the same channel.
5.8	Select **Not separ.** and press **ENT**.	The ATV61 is configured to use command and reference from the same channel.
5.9	Press **ESC** three times to exit the configuration mode.	ATV61 exits the configuration mode.

Fallback Behavior

When communications are lost between the drive and the fieldbus master, the drive and the motor attached to the drive go to a known state known as the fallback state. The behaviors of the drive and the motor differ depending on the cause of the communication loss.

The following behaviors apply when the default settings are used for the fallback parameters:

Event	Behavior
• Fieldbus communication is lost (and the NIM is configured to detect the failure). • The NIM fails or power is removed from the NIM. • The CAN cable between the ATV61 drive and the Advantys CANopen Extension module is disconnected. • The cable between the EOS and BOS (if configured) is removed.	The drive enters the Fault state. The motor stops rotating.
While the Advantys configuration software is in online mode, one of the following operations is performed: • download a new island configuration • issue a **Reset** command • issue a **Store to SIM Card** command • issue a **Protect** command • issue a **Stop** command	The drive enters Fault state. The motor stops rotating.
Stop PLC operation.	Depends upon the configuration of the fieldbus and the fieldbus master.

Error Reporting

When errors occur in an ATV61 drive, they can be reported in a variety of ways. If the Advantys configuration software is online, errors will be reported in the Log Window and in the Diagnostics tab of the Module Editor. Errors may also be reported in the island data process image in:

- the drive's Status Word
- the NIM's diagnostic data

Depending on the nature of the error, the ATV61 drive may not automatically notify the NIM of the error-free status, even after all sources of the error have been cleared. In this case, you may need to perform one or more of the following actions to clear the error displayed in the Advantys configuration software or the island data process image (including the NIM's diagnostic data):

- If the island is running and bit 3 (Fault bit) in the ATV61 Status Word is set, write 0x0080 to the Control Word in the NIM's output data process image. If the Status Word changes to 0x--40 or 0x--50 and no errors are indicated in the NIM's diagnostic data, the error condition has been cleared.
- In the rare event that the above procedure does not clear errors, issue a Reset command from the Advantys configuration software in online mode.
- If the above steps do not clear all errors in both the ATV61 drive and the island, the root cause of the problem that resulted in ATV61 error(s) may not have been resolved. In this case, check both the physical setup and drive configuration to ensure that all elements of the system are set up correctly.

ATV61 Process Image

Introduction

This topic discusses the input and output data process image for the ATV61 drive.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input Data

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The ATV61 drive sends a representation of the operating state of the drive and the attached motor to the island's NIM. The NIM stores the information in two contiguous 16-bit registers. (The specific positions of the registers in the process image are based on the module's node address on the island bus.) The input data process image can be read by:

- the fieldbus master
- an HMI panel connected to the NIM's CFG port
- the Advantys configuration software in online mode

For more information about each data word in the process image, see:

- ATV61/71 CANopen User's Manual (1755865)
- ATV61 Communication Parameters Manual (1760661)
- ATV61 Programming Manual (1760649)

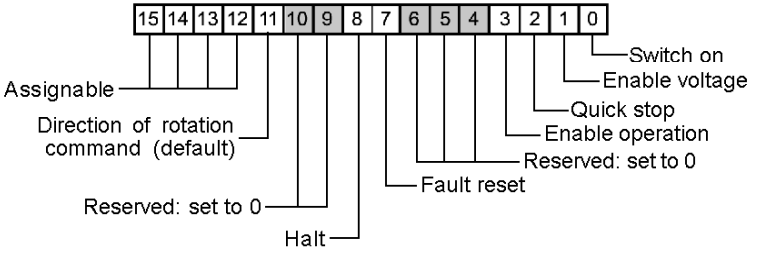
Output Data

The NIM keeps a record of output data in one block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software in online mode (if the island is in Test mode). The ATV61 drive uses two registers in the output process image.

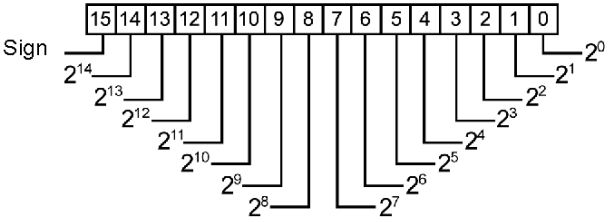
The NIM's output data process image is a reserved block of 4096 (16-bit) registers in the range 40001 to 44096 that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The ATV61 drive uses two contiguous registers in the output data block. (The specific positions of the registers in the process image are based on the module's node address on the island bus.)

Output Process Image

Register 1 — Control Word

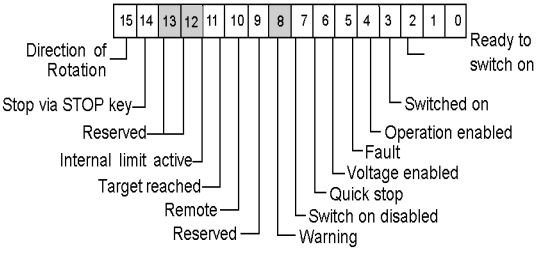


Register 2 — Speed Target. This 16-bit integer value represents the target velocity of the drive (RPM):

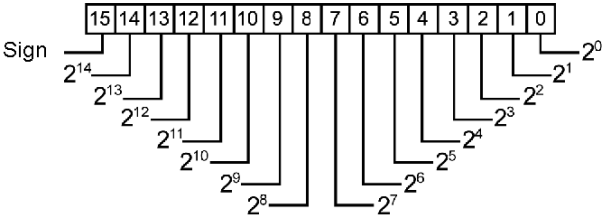


Input Process Image

Register 1 — Status Word



Register 2 — Output Speed . This 16-bit integer value represents the target velocity of the drive (RPM):



Bosch Rexroth HF 04 Valve Terminal System (CANopen Module RMV04-CO)

9

Overview

This chapter describes the Bosch Rexroth HF 04 Valve Terminal System CANopen Module RMV04-CO as an enhanced CANopen device on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following topics:

Topic	Page
Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Overview	166
Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Configuration	168
Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Process Image	170

Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Overview

Overview

The Bosch Rexroth HF 04 Valve System CANopen Module RMV04-CO can be used as an enhanced CANopen device in an Advantys STB island configuration. This implementation uses the CANopen connection of the RMV04-CO to communicate across the Advantys STB island, allowing the module to become a node on the Advantys STB island.

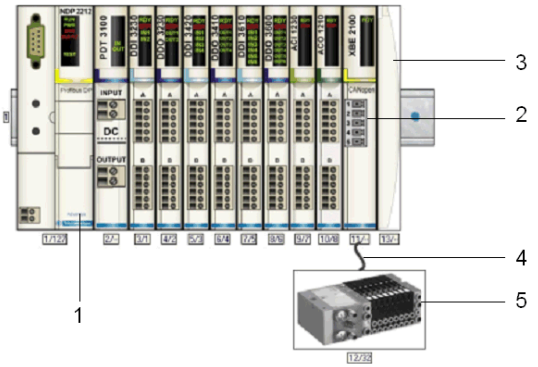
NOTE: Input and output modules cannot be connected to the RMV04-CO if it is connected to the Advantys system.

Use any standard Advantys STB NIM to control the RMV04-CO. The module will operate on any open fieldbus supported by Advantys STB.

NOTE: The software version of the RMV04-CO must be V 1.1 or later and the firmware version must be V 1.0 (5) or later.

Connections

Using the Advantys configuration software, select an RMV04-CO Bosch Rexroth HF 04 Valve Terminal System module from the Enhanced CANopen section of the Catalog Browser. An image of the module appears connected to the end of the island bus, as displayed below.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 MV04-C04-CO

NOTE: For descriptions of the RMV04-CO wiring, LED patterns, set-up procedures, and functionality, refer to user documentation provided by Bosch Rexroth.

Functional Description

The fieldbus master sends 3 bytes to the RMV04-CO to control the outputs of up to 24 valves. The RMV04-CO sends 1 byte to the fieldbus master, which contains the diagnostic information about the module and the valves *(see page 170)*.

Resume Normal Operation

Following certain events, it may be necessary to power-cycle the RMV04-CO encoder in order for it to become operational. Some of these events include:

- Stopped PLC operation.
- Fieldbus communication is lost (and the NIM is configured to detect the failure).
- NIM fails or power is removed from the NIM.
- The CAN cable between the RMV04-CO encoder and the Advantys CANopen Extension module is disconnected.
- The cable between the EOS and BOS (if configured) is removed.

While the Advantys configuration software is in online mode, one of the following operations is performed:

- download a new island configuration
- issue a Reset command
- issue a Store to SIM Card command
- issue a Protect command

Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Configuration

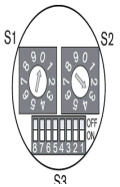
Overview

To use the Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO as an enhanced CANopen device on an Advantys STB island, you have to set the following:

- node ID
- baud rate
- diagnosis message activation switch
- bus termination

Configuring the RMV04-CO

The following table describes some of the important steps to help you configure the module as an enhanced CANopen device on an Advantys STB island.

Step	Action	Comment
1	Turn off the operating voltage of the device.	
2	Locate and open the upper PG screw cap A to access rotary switches S1 and S2 and DIP switch S3.) See the figure below for an illustration of the rotary and DIP switches. 	• Use rotary switches S1 and S2 to set the Node ID. • Use DIP switch S3 to set the baud rate and also to configure the diagnosis message.
3	Set the baud rate to 500 kbps using DIP switch S3 by setting switches 1 and 3 to ON and switch 2 to OFF.	500 kbps is the required operating baud rate for an Advantys STB island with enhanced CANopen devices.
4	Activate the diagnosis message using DIP switch S3 by setting switch 5 to ON.	This allows diagnostic data to be updated at the fieldbus master.
Note: After setting S3, make sure you set the unused switches to OFF.		
5	Set the node ID (1 to 32) with two rotary switches S1 and S2. Refer to the figure below for an example of setting the node ID with the rotary switches. 	The left switch S1 represents the tens (x10) position and the right switch S2 represents the ones (x1) position. In this illustration, the switches represent a node ID of 3. The configured node ID must match the one set for the module in the Advantys configuration software.

Step	Action	Comment
6	Locate and open the PG screw cap B to access the ON OFF switch S8 and DIP switches S4- S6. See the figure below for an illustration of these switches. 	The S4-S6 switches are used to assign the one of the two supply voltages to each valve group. Note: Please refer to the valve terminal documentation from Bosch Rexroth AG for more information.
7	Set the bus terminator with the ON OFF switch S8 in accordance with the module's physical position on the island bus: • on: The module is the last device on the STB island. • off: The encoder is in any other position on the STB island.	Switch S8 is used to assign the module's bus termination settings. To ensure reliable operation, the island bus must be terminated using a termination resistor at the last device. The terminating resistor in the module is only required when it is the last device on the island bus.

Bosch Rexroth HF 04 Valve Terminal System Module RMV04-CO Process Image

Introduction

This section provides you with information about the input and output data process image for the RMV04-CO valve system.

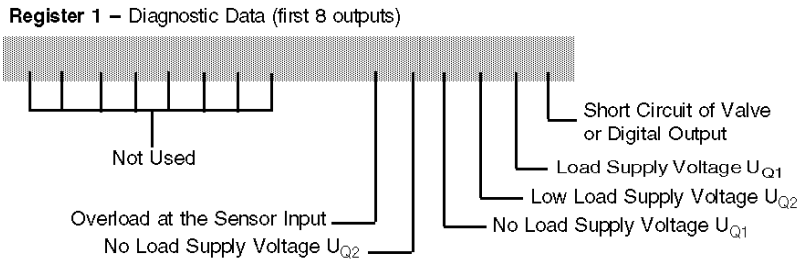
NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the Advantys STB Network Interface Module Application Guides. Separate guides are available for each supported fieldbus.

Input Data

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487 (refer to the figure below.) When the switch S3 is set as described in the previous section, the RMV04-CO sends Diagnostic Data to the island's NIM. This data corresponds to index 2020, subindex 2 of the module's object dictionary (OD - may have been defined earlier). The NIM stores the information in one 16-bit register. (The specific position of the register in the process image is based on the module's node address on the island bus.) The input data process image can be read by using the following methods:

- The fieldbus master
- An HMI panel connected to the NMI's CFG port
- The Advantys configuration software in online mode

Input Process Image

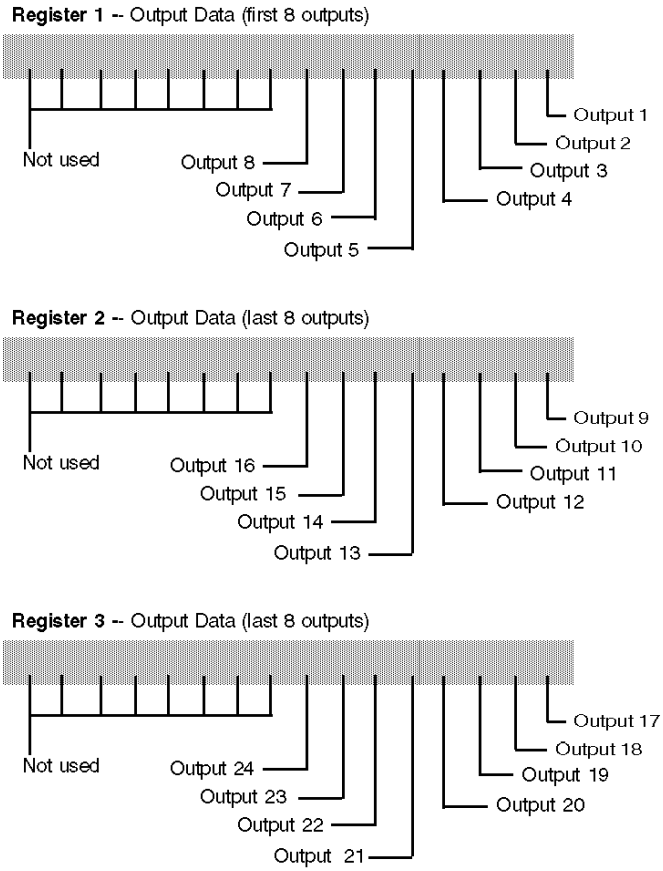

Register 1 – Diagnostic Data (first 8 outputs)
Not Used
Overload at the Sensor Input
No Load Supply Voltage U_{Q2}
Short Circuit of Valve or Digital Output
Load Supply Voltage U_{Q1}
Low Load Supply Voltage U_{Q2}
No Load Supply Voltage U_{Q1}

Output Data

Data sent to each output module on the island bus is represented in the NIM's output data process image, a reserved block of 4096 (16-bit) registers in the range 40001 to 44096. The RMV04-CO uses three contiguous registers (refer to the following figures and tables) in the output process image. (The specific positions of the registers in the process image are based on the module's node address on the island bus.) The output data block in the NIM can be written using the following methods:

- the fieldbus master
- an HMI panel connected to the NIM's CFG port (if the island in Persistent or Password Test mode)
- the Avantys configuration software in online mode (if the island is in test mode)

Ouput Process Images



CANopen TeSys U Motor Control Devices

10

Overview

This chapter describes Schneider Electric's TeSys U motor control devices, consisting of motor-starter controllers and motor controllers, used as enhanced CANopen devices on an Advantys STB island configuration. It covers the integration of the LULC08 CANopen communication module with seven different varieties of TeSys U devices.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
10.1	Introduction to TeSys U Motor Control Devices	174
10.2	CANopen TeSys U Sc St Starter Controller	184
10.3	CANopen TeSys U Sc Ad Starter Controller	192
10.4	CANopen TeSys U Sc Mu L	200
10.5	CANopen TeSys U Sc Mu R	209
10.6	CANopen TeSys U C Ad Controller	218
10.7	CANopen TeSys U C Mu L	229
10.8	CANopen TeSys U C Mu R	239

10.1 Introduction to TeSys U Motor Control Devices

Introduction

This section describes the makeup of a basic TeSys U motor control device and how it can be used as an enhanced CANopen device on an Advantys STB island configuration. Also, a description of the seven varieties of TeSys U motor control devices is included at the end of the section.

What's in this Section?

This section contains the following topics:

Topic	Page
TeSys U Motor Control Devices	175
Assembly of a TeSys U Motor Control Device	178
The Seven Varieties of TeSys U Motor Control Devices	183

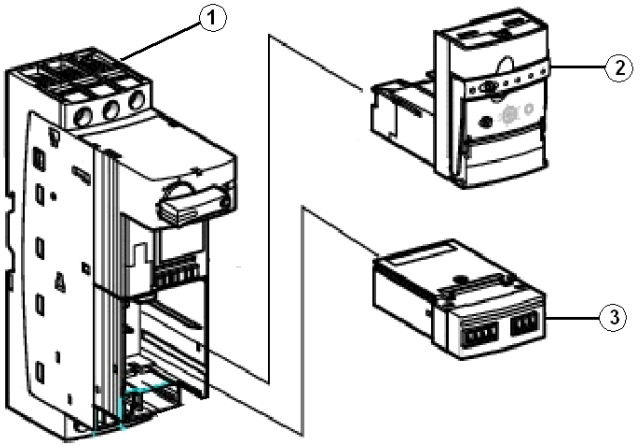
TeSys U Motor Control Devices

Introduction

TeSys U motor control devices provide motor control that ranges from the basic motor-starter controller with solid-state thermal overload protection to a sophisticated motor controller that communicates on networks and includes programmable motor protection.

Makeup of a TeSys U Motor Control Device

Using a plug-in modular design allows for a variety of components to makeup the configuration of a TeSys U motor control device. In this chapter, we will be concerned with different combinations of the three parts show in the following figure, to makeup seven different TeSys U motor control devices.



1 power base
2 control unit
3 communication function module

NOTE: Several additional plug-in components (not shown in this figure) can be added to the TeSys U power base. Refer to the *Schneider Electric TeSys U-Line Motor Starters catalogue* for details.

Using a plug-in modular design, the TeSys U-line of motor control devices allow maximum flexibility in motor control. You can select and install a variety of plug-in components to satisfy your application requirements.

Power Base

The power base provides the main contacts (power poles) for the device and is available in two configurations:

- Self-protected motor starter-controller base (shown above), 12 or 32A (approved for group motor installations or UL508 type E self-protected combination motor controller).
- Motor controller base, 12 or 32A (approved for group motor installation).

The 45 mm power base can be mounted on either a panel or on a 35 mm DIN rail.

Control Unit

Interchangeable control units provide control and thermal overload functions for the power bases and includes motor protection from 0.15 to 32A with built-in surge protection. These control units are available in three styles:

- Standard–provides basic Class 10 trip characteristics, no communications capabilities, and manual reset only.
- Advanced (for starter controllers)–provides a choice of Class 10 or Class 20 trip characteristics and allows for network communications with manual/auto reset when used with appropriate function models.
- Multifunctional–provides a wide range of programmable protection with built-in Modbus communications capabilities.

Communication Function Module

Each power base includes a blanking cover which can be replaced by three types of function modules that include:

- parallel wiring modules
- communication modules
- auxiliary contact modules

For the purposes of this discussion, the LULC08 CANopen communication module will be used in the function module location shown in the preceding figure.

With the LULC08 CANopen communication module, TeSys U motor-starter controllers and motor controllers can be used as enhanced CANopen devices for any Advantys STB island configuration. In this capacity, the controller's CANopen connection communicates across the Advantys STB island allowing it to function as a node on the island.

Applicable Advantys NIMs

You can use any of the following standard Advantys STB Network Interface Modules (NIMs) with the indicated firmware version to control TeSys U motor control devices.

Fieldbus	Advantys Part Number	Minimum FW Version Number
INTERBUS	STBNIB2212	2.02
CANopen	STBNCO2212	2.02
Profibus	STBNDP2212	2.04
Fipio	STBNFP2212	2.03
Ethernet TCP/IP	STBNIP2212	2.1.4
EtherNet/IP	STBNIC2212	2.xx
Device Net	STBNDN2212	2.04
Modbus Plus	STBNMP2212	2.02

Additional Information

Detailed descriptions of TeSys U Motor control components, wiring, LED patterns, set-up procedures and functionality can be found in the following Schneider Electric documents:

- LULC08 Communication Module User Manual (1744084)
- TeSys U Starter-Controllers Wiring Schemes (24640)
- TeSys U Communication Variables User Manual (1744082)
- LU-B- LU-S- Power Base Instruction Sheet (1629984)
- LUCA Control Unit Instruction Sheet (AAV40503)
- PowerSuite Instruction Sheet (1494182)

Assembly of a TeSys U Motor Control Device

Introduction

The CANopen TeSys U motor control devices can be assembled with a variety of components to makeup a final configuration of a motor-starter controller or motor controller. For the purpose of this discussion, we are concerned with the general makeup of a motor-starter controller consisting of the three components *(see page 175)* described previously.

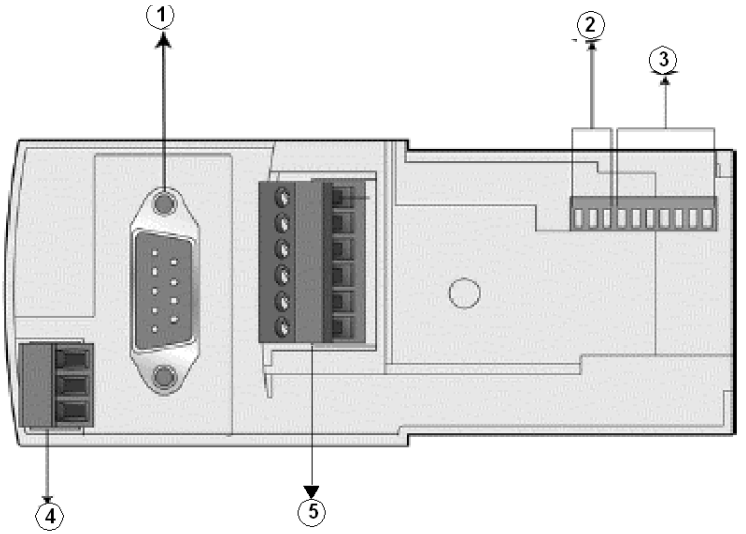
- power base
- control unit
- communication module

Once you have selected a power base and control unit for your specific application, along with a LULC08 CANopen Communication Module, you can proceed according to the following general instructions.

The LULC08 DIP Switches

Prior to installing the LULC08 CANopen Communication Module into the TeSys U power base, unit you need to set the baud rate and node ID address with the DIP switches located on the bottom of the module.

A bottom view of a LULC08 communication module is shown below:



1 CAN bus connector
2 baud rate
3 node ID address
4 power base connector
5 logic input, output & power connector

Setting the Baud Rate

For an Advantys STB island with enhanced CANopen devices the required baud rate is 500 kbps. Use the 3 left-most switches (SW8 to SW10) to assign a baud rate of 500 kbps as indicated on the following table and shown in the figure below.

SW10	SW9	SW8	Baud Rate
1	0	1	500 kbps
Switch (SW) positions: On = 1, Off = 0			

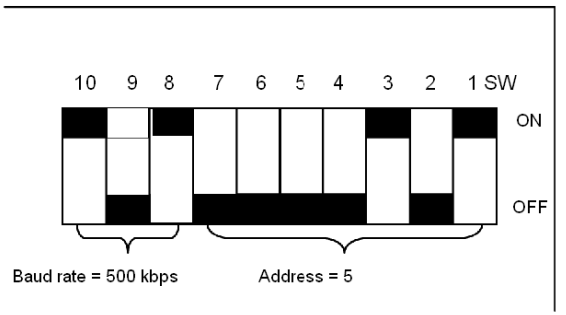
Setting the Node ID Address

The communication module's address on the CANopen bus is the Node-ID. According to Schneider class S20, the system allows you to assign an address from 1 to 127, using the 7 right-most switches (SW1 to SW7). Address 0 (zero) is not allowed and is considered as an invalid configuration.

NOTE: When using a TeSys U motor control device on an Advantys STB island, the maximum node ID allowed is 32.

You need to set the 7 right-most switches to represent the node ID address assigned to your TeSys U motor control device. As an example, an address of 5 is shown in the figure below.

Example:



Possible settings for the first 6 and last 3 addresses allowable for a TeSys U starter controller on a Advantys STB island are listed in the table below:

first 6 addresses....

SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	0	0	0	0	0	Not valid
0	0	0	0	0	0	1	1 (default value)
0	0	0	0	0	1	0	2
0	0	0	0	0	1	1	3

SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	0	0	1	0	0	4
0	0	0	0	1	0	1	5

last 3 addresses....

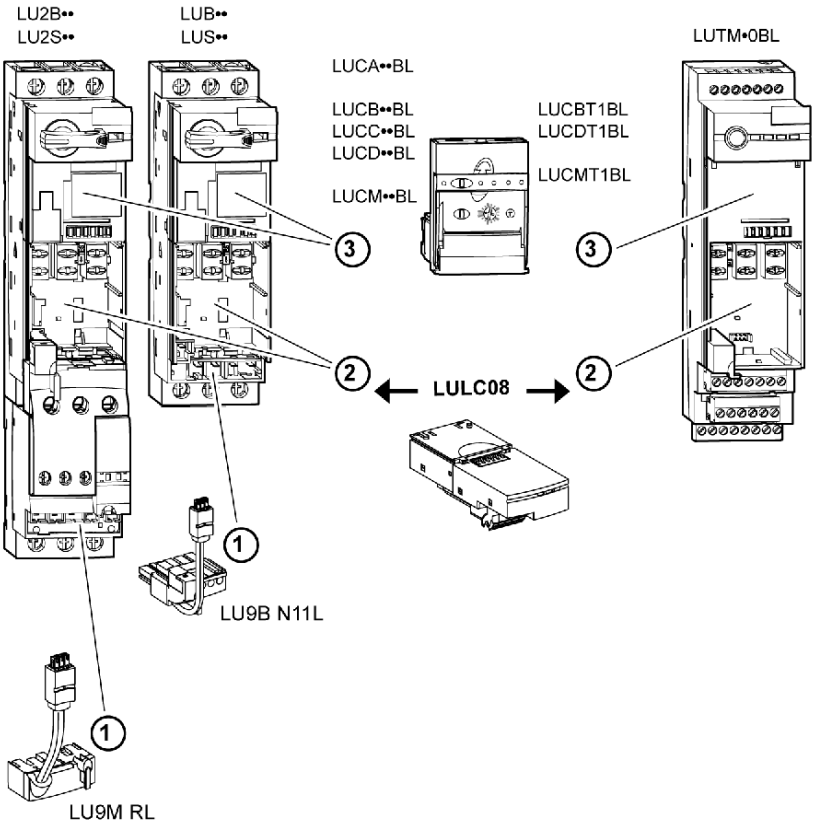
SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	1	1	1	1	0	30
0	0	1	1	1	1	1	31
0	1	0	0	0	0	0	32

Assembly Order

The LULC08 CANopen communication module is installed in a power base beneath the control unit which locks it in position. To install the module within the power base, refer to the figure below and perform the following steps:

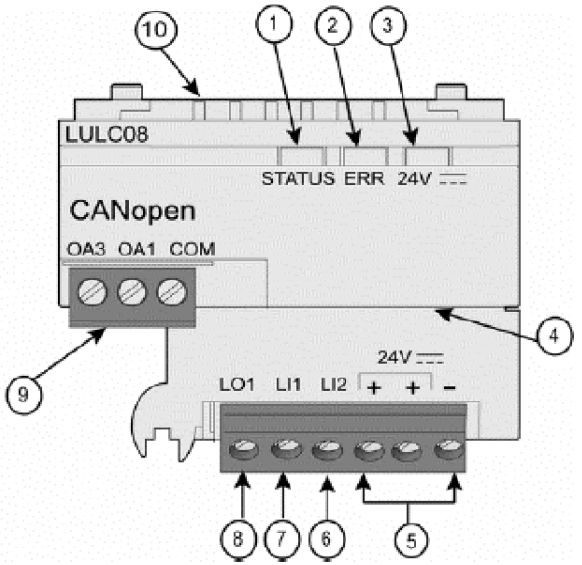
Step	Action
1	Insert one of the prewired coil connectors into the power base.
2	Insert the LULC08 CANopen communication module into the power base.
3	Insert the control unit that locks the module into place.

The numbers in the figure correspond to the step numbers of the table and to the components described in the action column of each step. Also, the figure shows the three types of base units available for a TeSys U motor control device. The left-hand two are starter-controller bases and the right-hand one is a controller base.



Front View of the LULC08 Module

To further aid in the set-up procedures for the TeSys U motor control device, the connectors and LEDs located on the LULC08 CANopen communication module are shown below.



1 2-color STATUS LED indicating CANopen module operational status
2 red ERR LED indicating CANopen module fault
3 green 24V⎓ LED indicating voltage presence at outputs OA1, OA3, LO1
4 sub-D 9 connector and 24V Bus (CAN external power supply-required)
5 connection of the 24V ⎓ power supply for outputs OA1, OA3, LO1 (the 2 terminals marked + are internally linked)
6 logic input 2
7 logic input 1
8 logic output 1, assignable depending on configuration reg. 685 (LSB)
9 24V⎓ wiring coil connector for the power base:
- OA1 assignment depends on configuration register 686 (LSB)
- OA3 assignment depends on configuration register 686 (MSB)

10 connector for communication with the advanced or multifunction control unit

The Seven Varieties of TeSys U Motor Control Devices

TeSys U Starter Variations

TeSys U motor control devices appear in the form of seven variants in the Advantys Configuration Software (ACS) as listed below.

- CANopen TeSys U Sc St
- CANopen TeSys U Sc Ad
- CANopen TeSys U Sc Mu L
- CANopen TeSys U Sc Mu R
- CANopen TeSys U C Ad
- CANopen TeSys U C Mu L
- CANopen TeSys U C Mu R

How to Identify a TeSys U Device

Each of these TeSys U motor control device variants are identified by the type of power base (**S**tarter **C**ontroller or **C**ontroller) that they employ. The abbreviations that are used and their meanings are as follows:

- Ad-**Ad**vanced control unit
- C-**C**ontroller
- Mu-**M**ultifunctional control unit
- Mu L-**M**ultifunctional control unit operating in **L**ocal mode
- Mu R-**M**ultifunctional control unit operating in **R**emote mode
- Sc-**S**tarter **C**ontroller
- St-**St**andard control unit

So, for example, CANopen TeSys U **Sc St** stands for:

- a TeSys U **S**tarter **C**ontrolller with a **St**andard Control Unit

What's Ahead

In the remainder of this chapter, we describe how to configure each of the seven variants in conjunction with the LULC08 CAN communication module to function as a node on an Advantys STB island.

10.2 CANopen TeSys U Sc St Starter Controller

Overview

This section describes the CANopen TeSys U Sc St variant of a TeSys U motor control device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U Sc St Starter Controller	185
CANopen TeSys U Sc St Data Process Image	189

Configuring the CANopen TeSys U Sc St Starter Controller

Introduction

The CANopen TeSys U **Sc St** is the TeSys U **S**tarter **C**ontroller with **St**andard Control Unit variant of the TeSys U series of motor control devices. It is assembled with an LUCA++BL Standard Control unit and any one of the following power bases:

- LUB12/LUS12-up to 12A, non-reversing
- LU2B12/LU2S12-up to 12A, reversing
- LUB32/LUS32-up to 32A, non-reversing
- LU2B32/LU2S32-up to 32A, reversing

The LULC08 CANopen communication module completes the configuration.

You can use this variant when you need a starter controller up to 15kW, for a 3-phase motor class 10, 0-12 or 0-32A rating, with a standard control unit that protects against overloads, short-circuits, phase imbalance, and insulation breaks, and offers a manual reset.

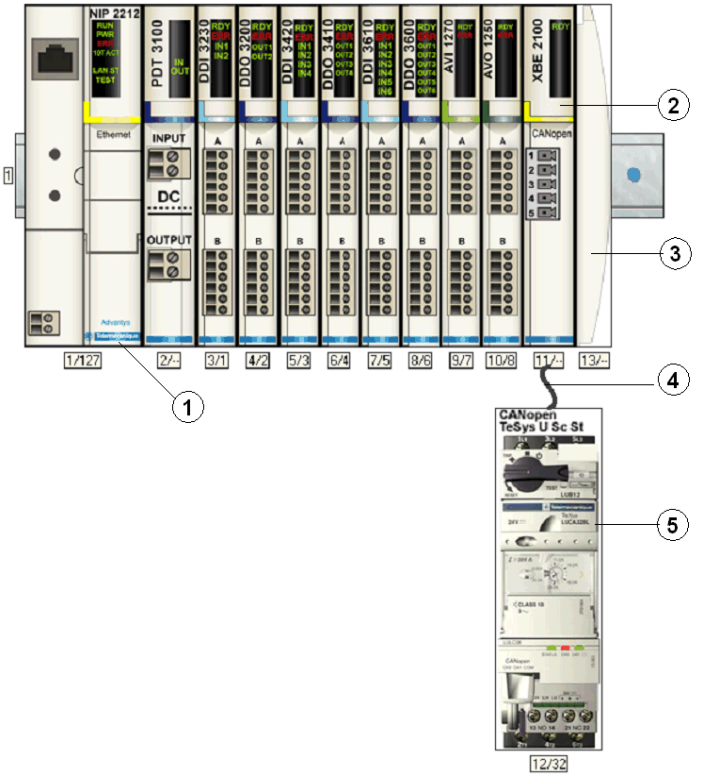
NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the fieldbus master.

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U Sc St on an STB island you need to set the baud rate and node ID address and assemble the components *(see page 178)*.

Connecting to the STB Island

The TeSys U Sc St starter-controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the starter. You use a CANopen extension cable to connect the TeSys U Sc St starter controller to the extension module. An example of this type of setup is shown in the following figure.

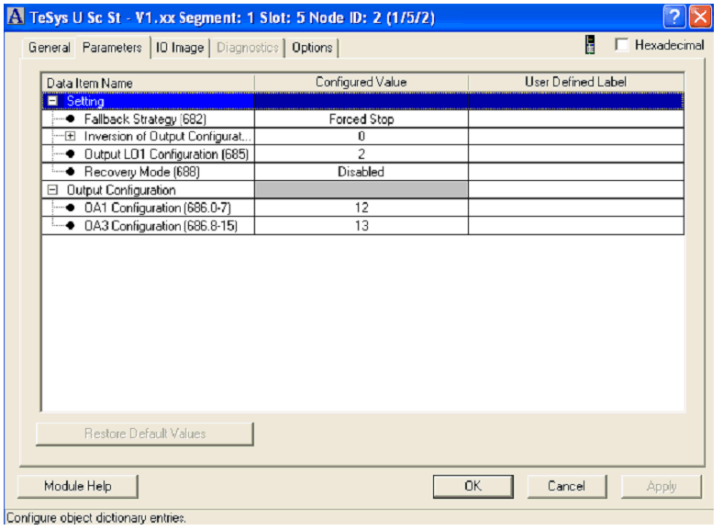


1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U Sc St starter-controller

NOTE: You can use any standard Advantys STB NIM *(see page 177)*to control the TeSys U starter-controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U Sc St and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys U Sc St starter-controller from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the starter-controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Right-click on the TeSys U Sc St module and select **Module Editor** to open its editor.  **Note:** The values in the **Configure Value** column represent default values.
6	Select the Parameters tab and in the **Configured Value** column, setup the parameters for: ● Communications loss fallback strategy ● Inversion of Output ● Output LO1 ● Recovery mode ● Outputs OA1 and OA3 Refer to the TeSys *LULC08 CANopen Communication Manual* (1744084) for additional information on setting up these parameters.

Step	Action
7	Assign labels for each of the parameters in the **User Defined Label** column (optional action). **Note:** There are no options to configure with this device.
8	Click on **OK** to save the parameter settings and return to the main menu.
9	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the starter-controller in the ACS.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U Sc St Data Process Image

Introduction

The output and input data process images for the TeSys U Sc St starter controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U starter-controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data image) to the starter-controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 6 words (input data image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● PKW response object for PKW service (2 words) ● PKW response data for PKW service (2 words)

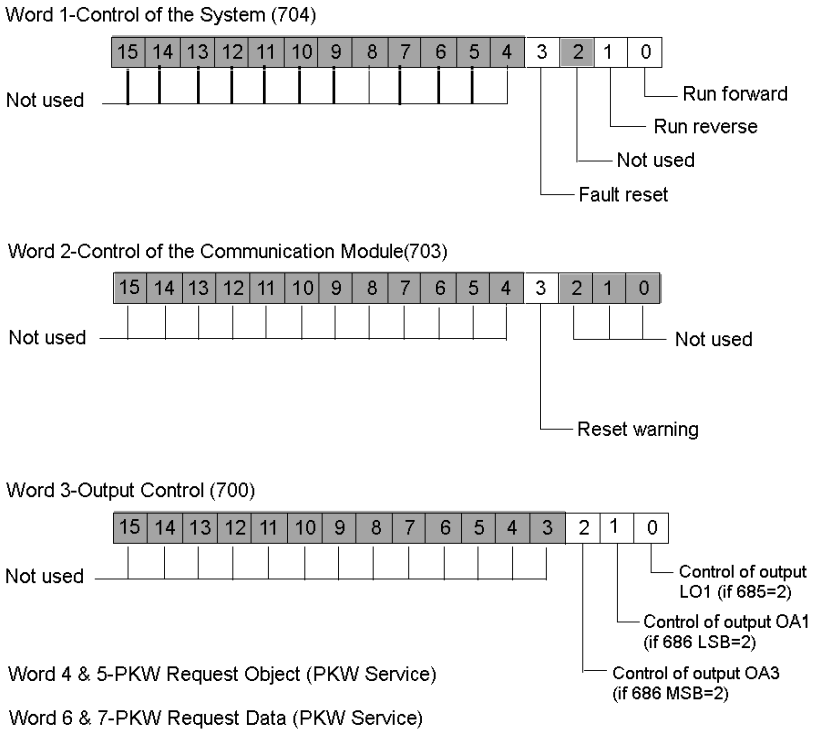
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U Sc St device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Run forward
Run reverse
Not used
Fault reset
Word 2-Control of the Communication Module(703)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Not used
Reset warning
Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (if 685=2)
Control of output OA1 (if 686 LSB=2)
Control of output OA3 (if 686 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

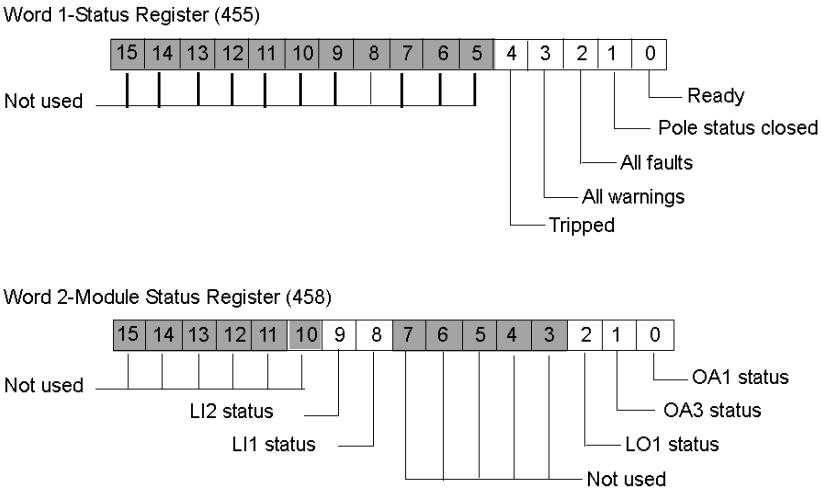
Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U Sc St device reports the position starter status information in 6 contiguous registers in this block. (The exact registers in the process image vary, based on the device's node address on the island bus.) The input data process image can be read by:

- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

Representations of the input data image are shown below.

Input Process Image



Word 3 & 4-PKW Request Object (PKW Service)

Word 5 & 6-PKW Request Data (PKW Service)

10.3 CANopen TeSys U Sc Ad Starter Controller

Overview

This section describes the CANopen TeSys U Sc Ad variant of a TeSys U motor control device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U Sc Ad Starter Controller	193
CANopen TeSys U Sc Ad Data Process Image	197

Configuring the CANopen TeSys U Sc Ad Starter Controller

Introduction

The CANopen TeSys U **Sc Ad** is the TeSys U **S**tarter **C**ontroller with **Ad**vanced Control Unit variant of the TeSys U series of motor control devices. It is assembled with any one of the following combinations of power base and advanced control unit:

Select one of the following power bases:

- LUB12/LUS12-up to 12A, non-reversing
- LU2B12/LU2S12-up to 12A, reversing
- LUB32/LUS32-up to 32A, non-reversing
- LU2B32/LU2S32-up to 32A, reversing

Select one of the following Advanced Control Units:

- LUCB++BL ++=X6 or 1X or 05 or 12 or 18 or 32
- LUCC++BL ++=X6 or 1X or 05 or 12 or 18 or 32
- LUCD++BL ++=X6 or 1X or 05 or 12 or 18 or 32

The LULC08 CANopen communication module completes the configuration.

You can use this variant when you need a starter-controller up to 15kW, for a 3-phase motor class 10, 0-12 or 0-32A rating, with an advanced control unit that protects against overloads, short-circuits, phase imbalance, and insulation breaks, and offers a manual or remote/automatic reset.

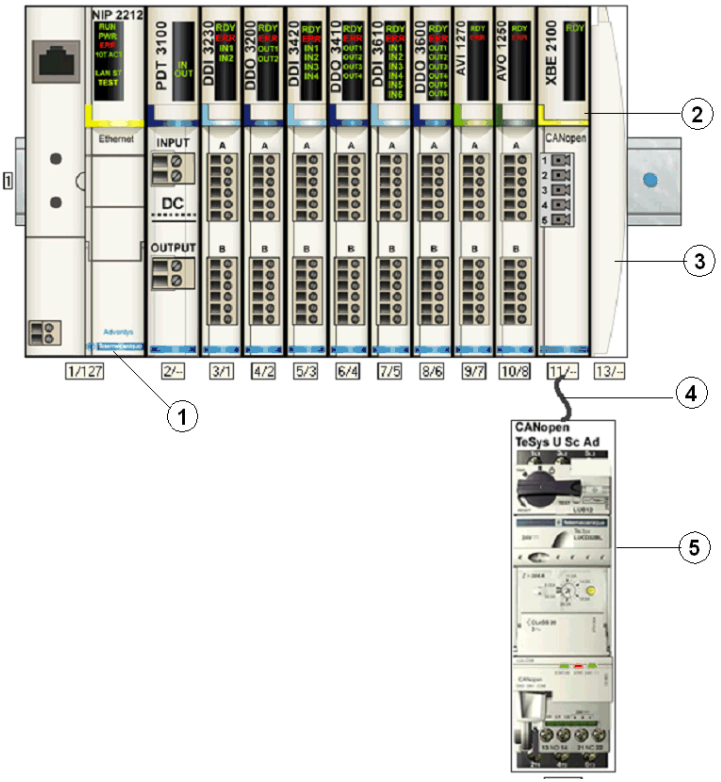
NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the fieldbus master.

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U Sc Ad on an STB island, you need to set the baud rate and node ID address and assemble the components *(see page 178)*.

Connecting to the STB Island

The TeSys U Sc Ad motor starter-controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the starter-controller. You use a CANopen extension cable to connect the TeSys U Sc Ad starter controller to the extension module. An example of this type of setup is shown in the following figure.

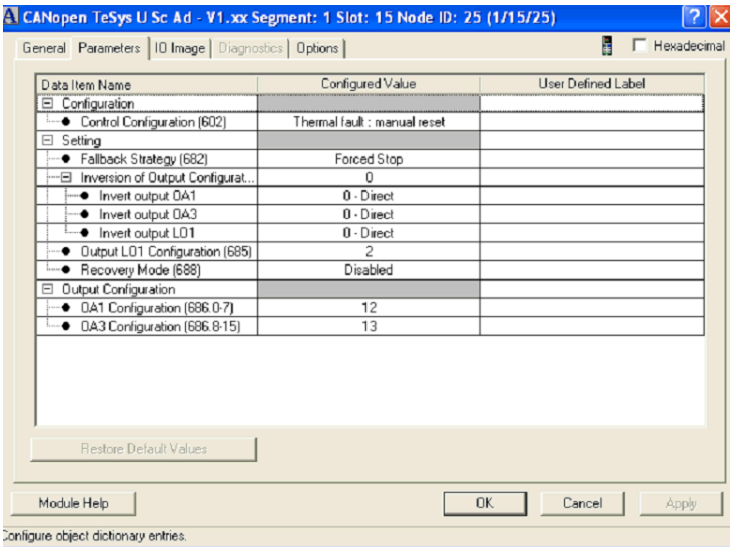


1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U Sc Ad starter-controller

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U starter-controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U Sc Ad and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys U Sc Ad starter-controller from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the starter-controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Right-click on the TeSys U Sc Ad module and select **Module Editor** to open its editor.  **Note:** The values in the **Configure Value** column represent default values.
6	Select the Parameters tab and in the **Configured Value** column, setup the parameters for: • Communications loss fallback strategy • Inversion of Output • Output LO1 • Recovery mode • Outputs OA1 and OA3 Refer to the TeSys *LULC08 CANopen Communication Manual* (1744084) for additional information on setting up these parameters.

Step	Action
7	Assign labels for each of the parameters in the **User Defined Label** column (optional action). **Note:** There are no options to configure with this device.
8	Click on **OK** to save the parameter settings and return to the main menu.
9	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the starter-controller in the ACS.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U Sc Ad Data Process Image

Introduction

The output and input data process images for the TeSys U Sc Ad starter controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U Sc Ad Starter-Controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the starter-controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 6 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● PKW response object for PKW service (2 words) ● PKW response data for PKW service (2 words)

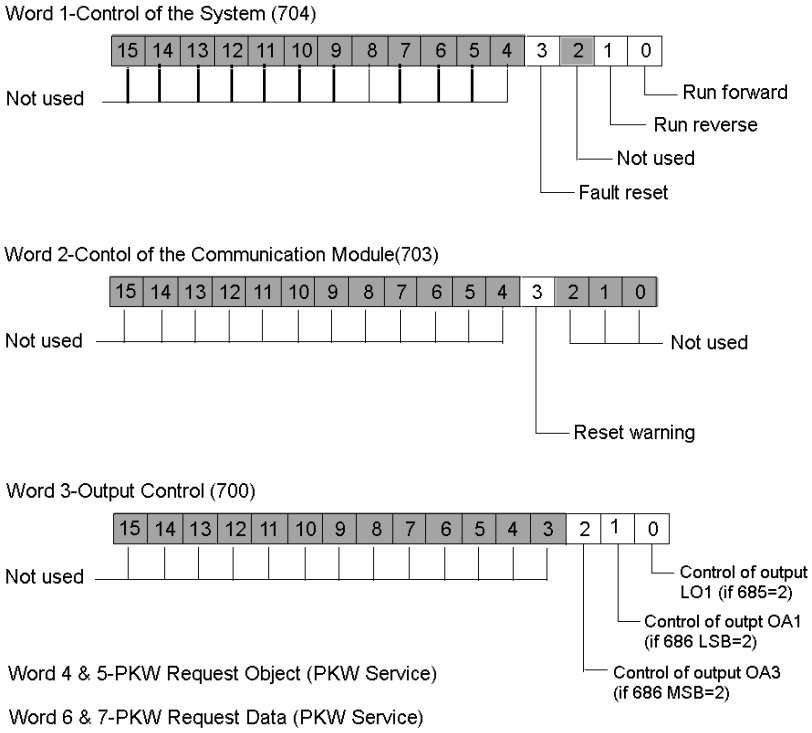
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U Sc Ad device uses 5 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Run forward
Run reverse
Not used
Fault reset
Word 2-Contol of the Communication Module(703)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Not used
Reset warning
Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (if 685=2)
Control of outpt OA1 (if 686 LSB=2)
Control of output OA3 (if 686 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U Sc Ad device reports the position starter status information in 5 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

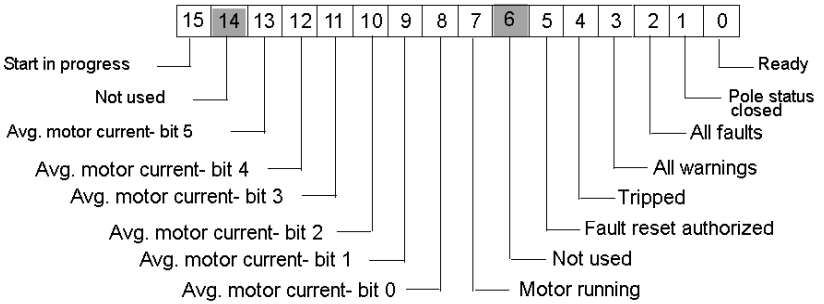
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual (1744802)*.

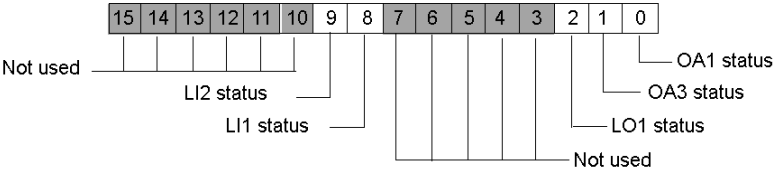
Representations of input data image are shown below.

Input Process Image

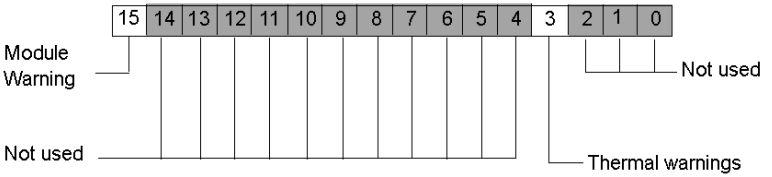
Word 1-Status Register (455)



Word 2-ModuleStatus Register (458)



Word 3-warning register (461)



Word 4-PKW Request Object (PKW Service)

Word 5-PKW Request Data (PKW Service)

10.4 CANopen TeSys U Sc Mu L

Overview

This section describes the CANopen TeSys U Sc Mu L variant of a TeSys U motor control device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U Sc Mu L Starter Controller	201
CANopen TeSys U Sc Mu L Data Process Image	205

Configuring the CANopen TeSys U Sc Mu L Starter Controller

Introduction

The CANopen TeSys U **Sc Mu L** is the TeSys U **S**tarter **C**ontroller with **Mu** function Control Unit operating in **L**ocal Mode, variant of the TeSys U series of motor control devices.

You can use this variant when you need a starter or a starter-controller up to 15kW, for a 3-phase motor class 10, 0-12 or 0-32A rating, with a multi-function control unit that protects against overloads, short-circuits, phase imbalance, insulation breaks, and offers a manual or automatic reset.

NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the fieldbus master.

Makeup of the CANopen TeSys U Sc Mu L

The makeup of the CANopen TeSys U Sc Mu L device as discussed in this section can be assembled with any one of the following combinations of power base and advanced control unit:

Select one of the following power bases:

- LUB12/LUS12-up to 12A, non-reversing
- LU2B12/LU2S12-up to 12A, reversing
- LUB32/LUS32-up to 32A, non-reversing
- LU2B32/LU2S32-up to 32A, reversing

Select one of the following Multifunctional Control Units:

- LUCM++BL ++=X6 or 1X or 05 or 12 or 18 or 32

The LULC08 CANopen communication module completes the configuration.

The functions that the Multifunctional Control Unit provide are discussed below.

The Multifunction Control Unit

The LUCM Multifunction Control Unit controls, protects and monitors the LUBxx and LUSxx bases (listed above) and performs the following functions:

Protection

- against overcurrent
- against thermal overloads, with choice of trip classes from 5 to 30
- against ground faults
- against phase imbalances
- against mechanical jams during or after the start-up phase
- against idling
- against tripping of the starter via an external signal (as an option)

Warning

The LUCM Multifunction Control Unit includes a warning associated with each of the above listed protection functions. The warning level can be configured and is independent from the protection trip level.

Diagnostic

Records and displays:

- number of operating hours for the motor
- number of starts
- number of trips
- cause of each trip

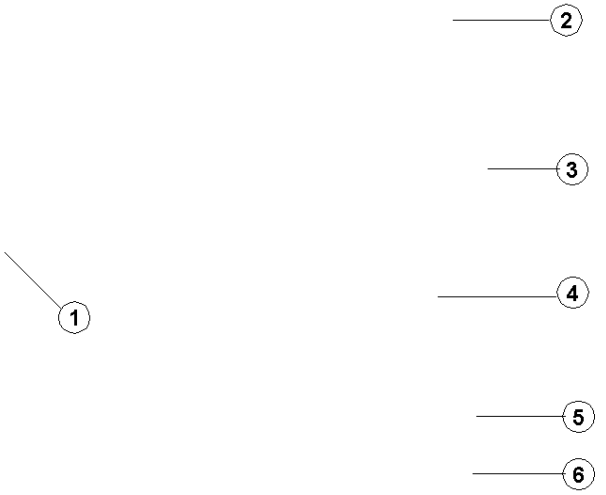
For the last five trips, the multifunction control unit records the status of the motor-starter at the time of the trip (value of currents, thermal status, and trip type).

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U Sc Mu L on an STB island, you need to set the baud rate, node ID address and assemble the starter-controller components *(see page 178)*.

Connecting to the STB Island

The TeSys U Sc Mu L motor starter-controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the starter-controller. You use a CANopen extension cable to connect the TeSys U Sc Mu L Starter-Controller to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U Sc Mu L starter-controller
6 display window and keypad

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U starter-controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U Sc Mu L and the Advantys STB island.

Step	Action
1	Start the ACS software. **Note:** There are no parameters and no options to configure for this device from within the ACS.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys U Sc Mu L starter-controller from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the starter-controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Click on **OK** to save the configuration and return to the main menu.
6	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the starter-controller in the ACS.

Configuring the TeSys Sc Mu L Parameters

Next, use the built-in-display window/keypad on the front panel of the starter-controller (see figure above) or a PC with the PowerSuite software to configure parameters within the TeSys U Sc Mu L. Local mode is the Multi-function Control Unit's default mode of operation.

NOTE: You must use PowerSuite or the built-in-display to set the mode to Local. It is not possible to set parameters through the ACS.

Refer to the *Power Suite Instruction Sheet 1494182* for details on the setup and operation of the PowerSuite software on a PC.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U Sc Mu L Data Process Image

Introduction

The output and input data process images for the TeSys U Sc Mu L starter-controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U Sc Mu L starter controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the starter-controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 8 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● Warning Register (that is, thermal warning) ● Mechanical and Power Supply Status Register (that is, Contactor Position On) ● PKW request object for PKW service (2 words) ● PKW response data for PKW service (2 words)

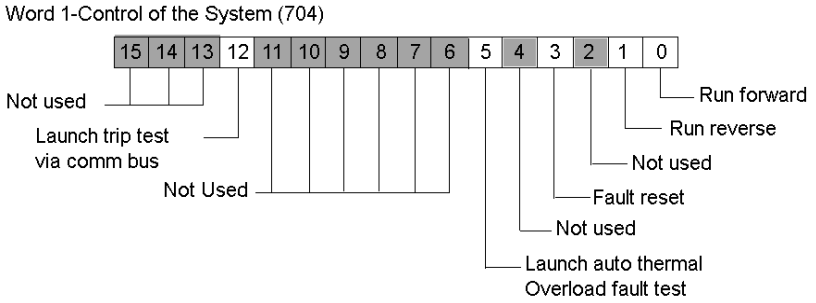
Output Data Process Image

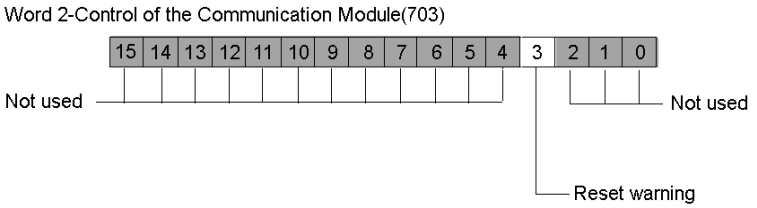
The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

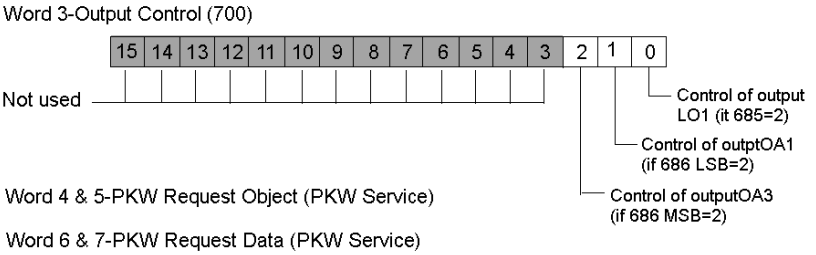
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U Sc Mu L device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Launch trip test via comm bus
Not Used
Run forward
Run reverse
Not used
Fault reset
Not used
Launch auto thermal Overload fault test




Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (it 685=2)
Control of outptOA1 (if 686 LSB=2)
Control of outputOA3 (if 686 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

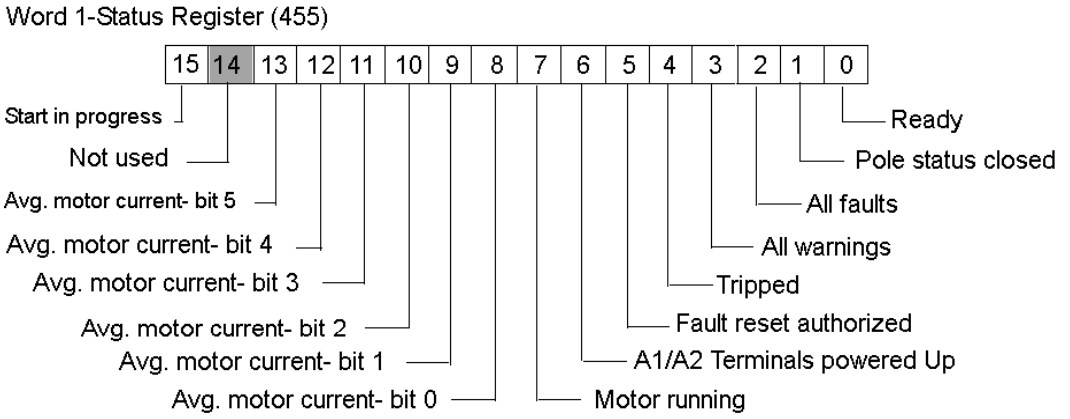
Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U Mu L device reports the position starter status information in 8 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

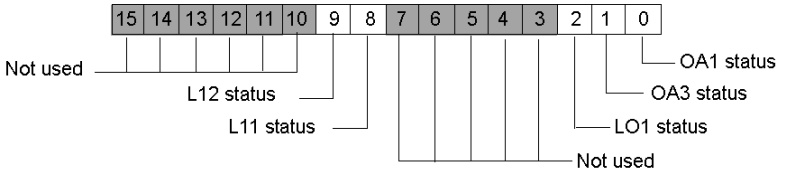
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

Representations of the input data image are shown below.

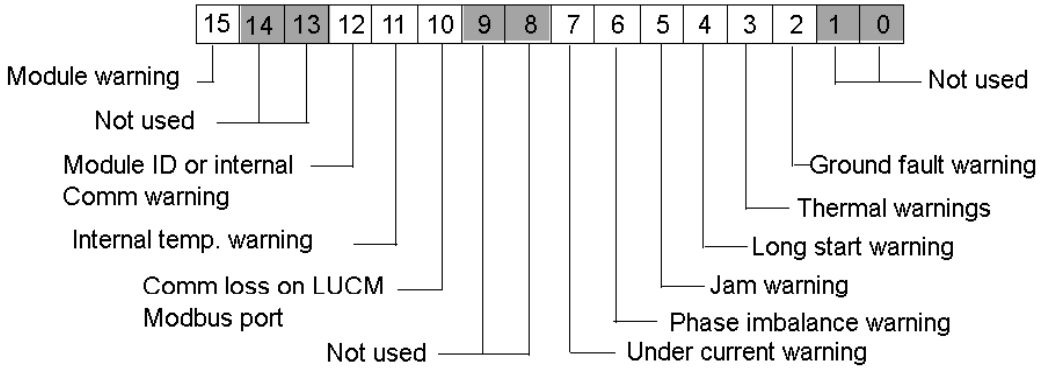
Input Process Image


Word 1-Status Register (455)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
Not used
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Ready
Pole status closed
All faults
All warnings
Tripped
Fault reset authorized
A1/A2 Terminals powered Up
Motor running

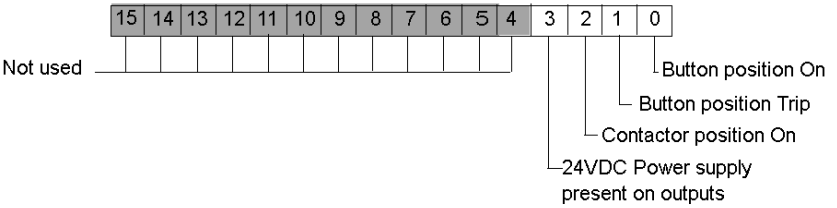
Word 2-Module Status Register (458)



Word 3-Warning Register (461)



Word 4-Mechanical & Power Supply Status Register (457)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Button position On
Button position Trip
Contactor position On
24VDC Power supply present on outputs

Word 5 & 6-PKW Request Object (PKW Service)

Word 7 & 8-PKW Request Data (PKW Service)

10.5 CANopen TeSys U Sc Mu R

Overview

This section describes the CANopen TeSys U Sc Mu R variant of a TeSys U motor control device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U Sc Mu R	210
CANopen TeSys U Sc Mu R Data Process Image	214

Configuring the CANopen TeSys U Sc Mu R

Introduction

The CANopen TeSys U **Sc Mu R** is the TeSys U **S**tarter **C**ontroller with **Mu** function Control Unit operating in **R**emote Mode, variant of the TeSys U series of motor control devices.

You can use this variant when you need a starter or a starter-controller up to 15kW, for a 3-phase motor class 10, 0-12 or 0-32A rating, with a multi-function control unit that protects against overloads, short-circuits, phase imbalance, insulation breaks, and offers a manual or automatic reset.

NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the fieldbus master.

Makeup of the CANopen TeSys U Sc Mu R

The makeup of the CANopen TeSys U Sc Mu R device as discussed in this section can be assembled with any one of the following combinations of power base and advanced control unit:

Select one of the following power bases:

- LUB12/LUS12-up to 12A, non-reversing
- LU2B12/LU2S12-up to 12A, reversing
- LUB32/LUS32-up to 32A, non-reversing
- LU2B32/LU2S32-up to 32A, reversing

Select one of the following Multifunctional Control Units:

- LUCM++BL ++=X6 or 1X or 05 or 12 or 18 or 32

The LULC08 CANopen communication module completes the configuration.

The functions that the Multifunctional Control Unit provide are discussed below.

The Multifunction Control Unit

The LUCM Multifunction Control Unit controls, protects and monitors the LUBxx and LUSxx bases (listed above) and performs the following functions:

Protection

- against overcurrent
- against thermal overloads, with choice of trip classes from 5 to 30
- against ground faults
- against phase imbalances
- against mechanical jams during or after the start-up phase
- against idling
- against tripping of the starter via an external signal (as an option)

Warning

The LUCM Multifunction Control Unit includes a warning associated with each of the above listed protection functions. The warning level can be configured and is independent from the protection trip level.

Diagnostic

Records and displays:
- number of operating hours for the motor
- number of starts
- number of trips
- cause of each trip

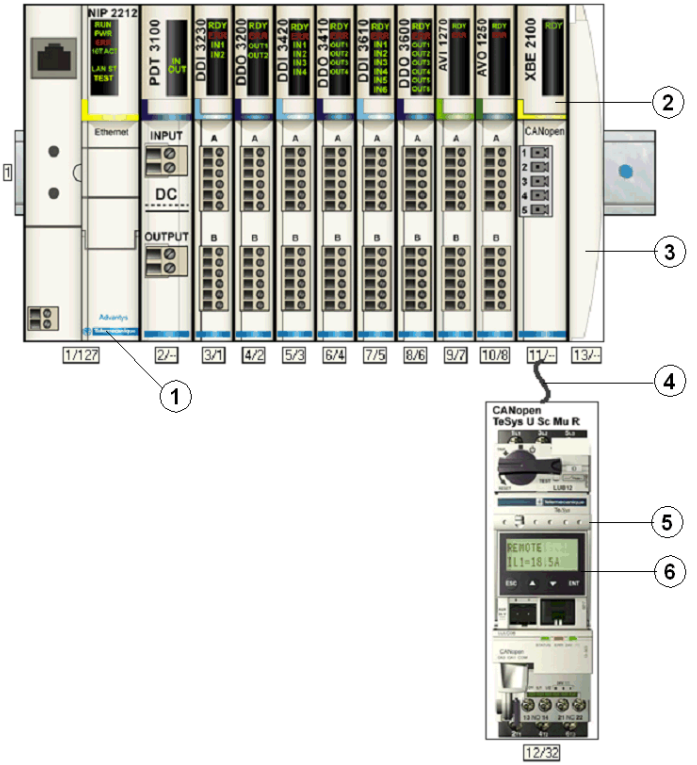
For the last five trips, the multifunction control unit records the status of the motor-starter at the time of the trip (value of currents, thermal status, and trip type).

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U Sc Mu R on an STB island, you need to set the baud rate, node ID address and assemble the starter-controller components *(see page 178)*.

Connecting to the STB Island

The TeSys U Sc Mu R motor starter-controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the starter-controller. You use a CANopen extension cable to connect the TeSys U Sc Ad Starter-Controller to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U Sc Mu R starter-controller
6 display window and keypad

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U starter-controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U Sc Mu R and the Advantys STB island.

Step	Action
1	Start the ACS software. **Note:** There are no parameters and no options to configure for this device from within the ACS.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys U Sc Mu R starter-controller from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the starter-controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Click on **OK** to save the configuration and return to the main menu.
6	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the starter-controller in the ACS.

Configuring the TeSys U Sc Mu R Parameters

Next, use the built-in-display window/keypad on the front panel of the starter-controller (see figure above) or a PC with the PowerSuite software to configure parameters within the TeSys U Sc Mu R. Remote mode is the Multi-function Control Unit's default mode of operation.

NOTE: You must use PowerSuite or the built-in-display to set the mode to Local. It is not possible to set parameters through the ACS.

Refer to the *Power Suite Instruction Sheet 1494182* for details on the setup and operation of the PowerSuite software on a PC.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U Sc Mu R Data Process Image

Introduction

The output and input data process images for the TeSys U Sc Mu R starter-controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U Sc Mu R Starter-Controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the starter-controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 8 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● Warning Register (that is, thermal warning) ● Mechanical and Power Supply Status Register (that is, Contactor Position On) ● PKW request object for PKW service (2 words) ● PKW response data for PKW service (2 words)

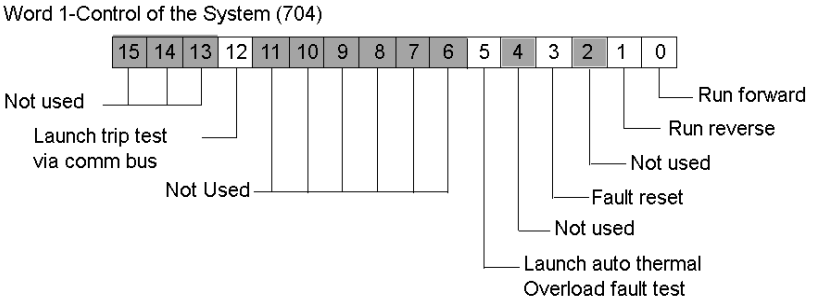
Output Data Process Image

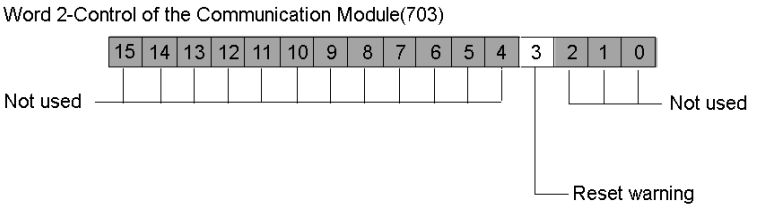
The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

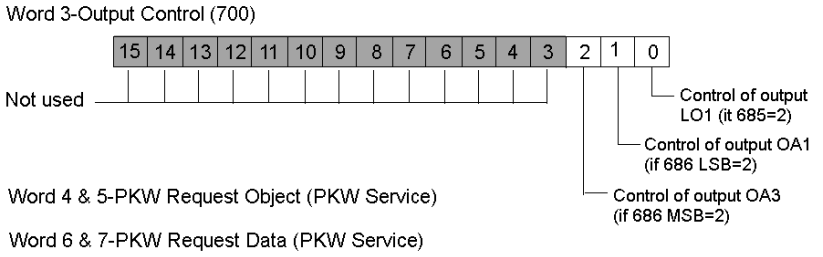
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U Sc Mu R device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Launch trip test via comm bus
Not Used
Launch auto thermal Overload fault test
Not used
Fault reset
Not used
Run reverse
Run forward




Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (it 685=2)
Control of output OA1 (if 686 LSB=2)
Control of output OA3 (if 686 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

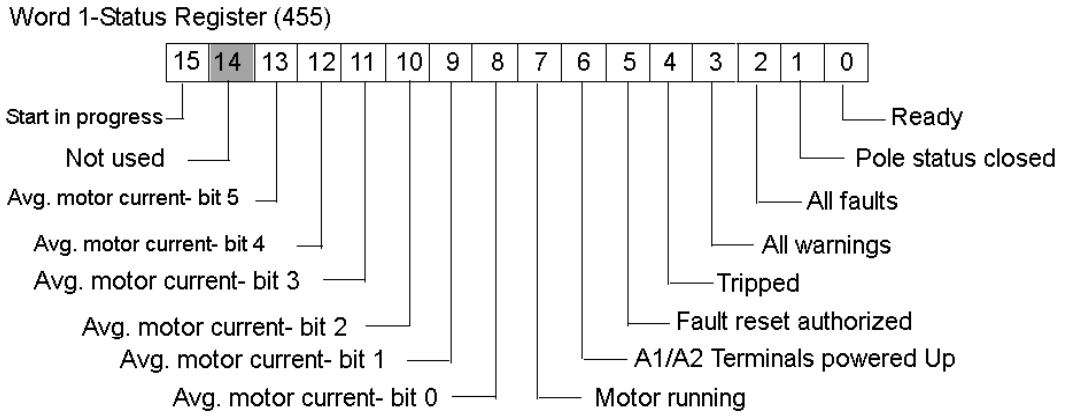
Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U Mu R device reports the position starter status information in 8 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

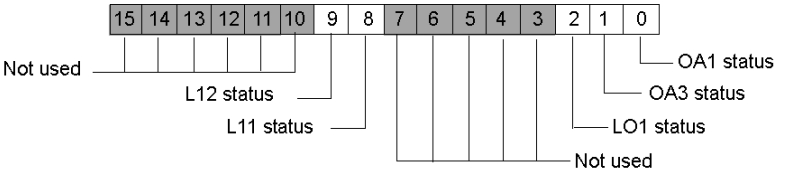
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

Representations of the input data process image are shown below.

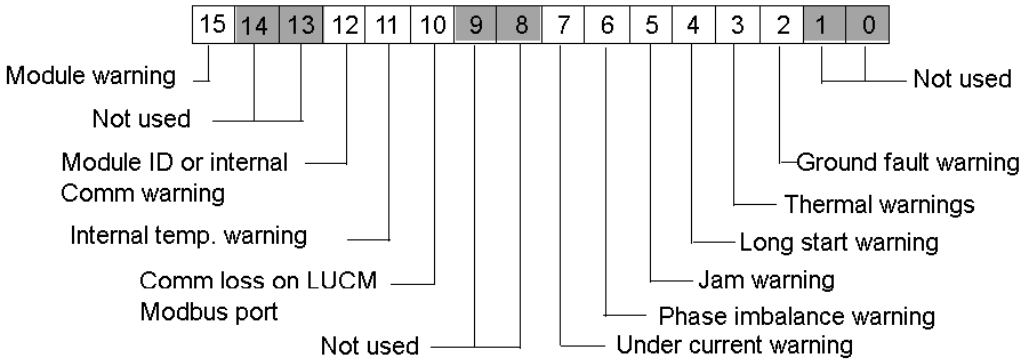
Input Process Image


Word 1-Status Register (455)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
Not used
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Ready
Pole status closed
All faults
All warnings
Tripped
Fault reset authorized
A1/A2 Terminals powered Up
Motor running

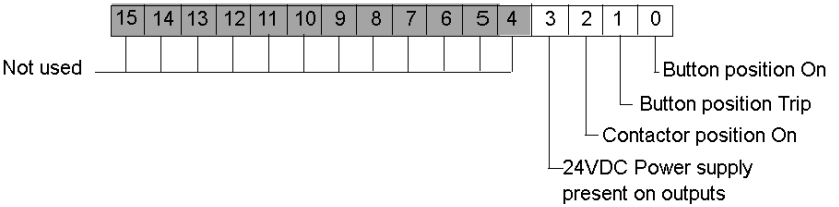
Word 2-Module Status Register (458)



Word 3-Warning Register (461)



Word 4-Mechanical & Power Supply Status Register (457)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Button position On
Button position Trip
Contactor position On
24VDC Power supply present on outputs

Word 5 & 6-PKW Request Object (PKW Service)

Word 7 & 8-PKW Request Data (PKW Service)

10.6 CANopen TeSys U C Ad Controller

Overview

This section describes the CANopen TeSys U C Ad variant of a TeSys U motor control device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U C Ad Controller	219
CANopen TeSys U C Ad Data Process Image	225

Configuring the CANopen TeSys U C Ad Controller

Introduction

The CANopen TeSys U **C Ad** is the TeSys U **C**ontroller with **Ad**vanced Control Unit variant of the TeSys U series of motor control devices.

You can use this variant when you need a motor-controller up to 450kW, for a 3-phase motor class 10-20, with an advanced control unit that protects against overloads, short-circuits, phase imbalance, insulation breaks, and offers a manual or remote reset.

Makeup of the CANopen TeSys U C Ad

The makeup of the CANopen TeSys U C Ad device as discussed in this section can be assembled with one of the following combinations of power base and advanced control unit:

Select one of the following power bases

- LUTM10BL
- LUTM 20BL

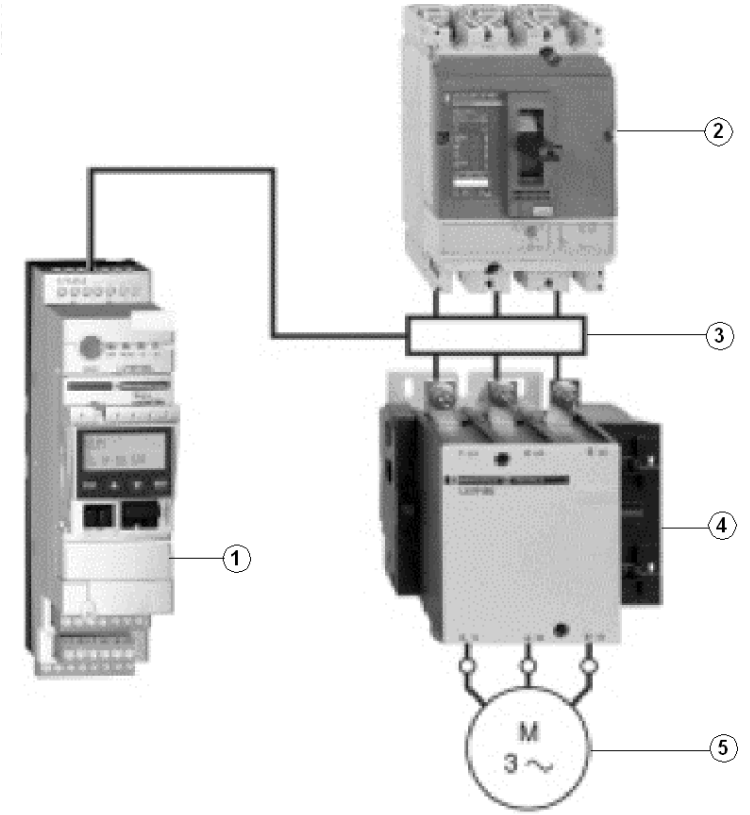
Select one of the following Advanced Control Units

- LUCBT1BL
- LUCDT1BL

The LULC08 CANopen communication module completes the configuration.

Typical Arrangement of a TeSys U C Ad Motor Controller

A typical arrangement of a TeSys U C Ad is shown in the below figure.



1 TeSys U C Ad motor controller
2 short circuit protection device
3 current transformer
4 contactor
5 motor

When it is used with a short-circuit device and a contactor, as shown above, the TeSys U C Ad controller creates a motor starter that provides:

- overload protection
- motor-starter control
- application monitoring

Above 32 A, the TeSys U C Ad controller provides a motor starter management solution identical to that provided by TeSys U starter controllers described in Sections 10.2 through 10.5.

Conditions of Use

Irrespective of the nominal current value of the motor it is supposed to control, the TeSys U C Ad controller is always used with an external current transformer whose:

- Secondary is at 1A nominal.
- Primary is selected according to the motor's nominal current.

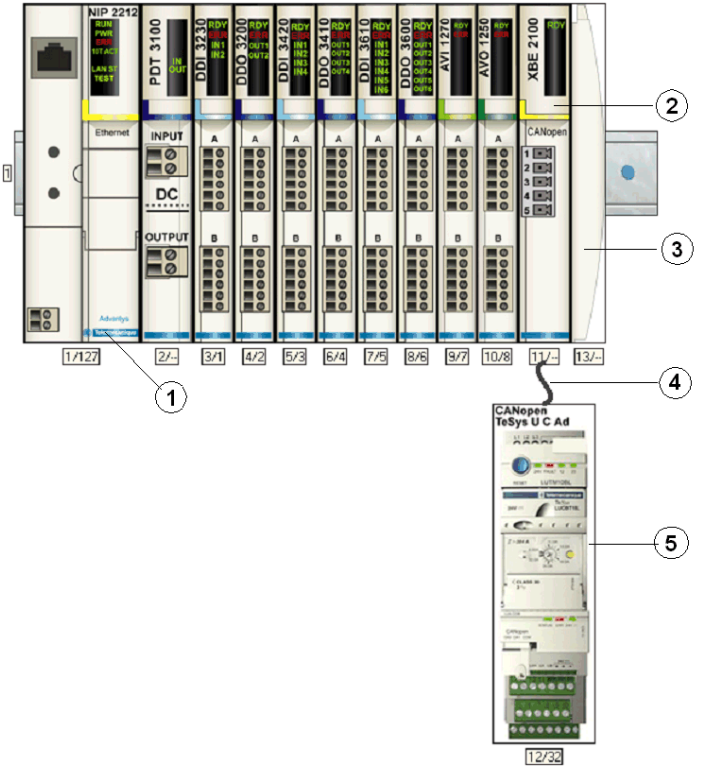
NOTE: In an installation containing TeSys U starter controllers and TeSys U controllers, motor management is identical from the point-of-view of the PLC.

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U C Ad on an STB island, you need to set the baud rate, node ID address and assemble the controller components *(see page 178)*.

Connecting to the STB Island

The TeSys U C Ad requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys U C Ad controller to the extension module. An example of this type of setup is shown in the following figure.

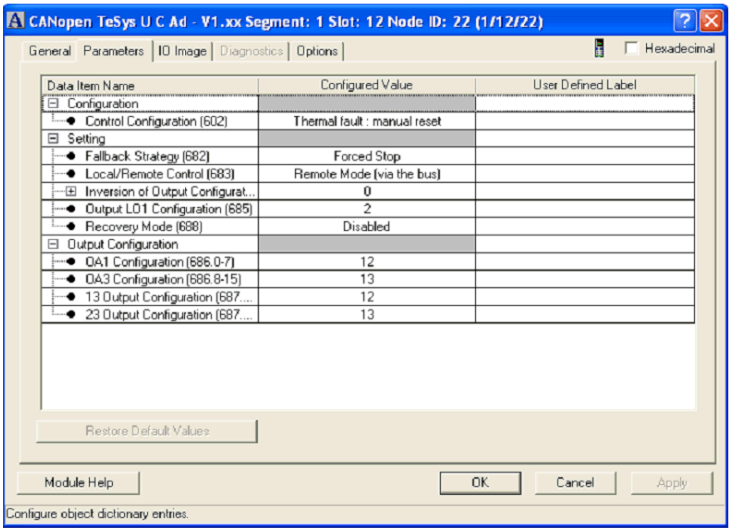


1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U C Ad controller

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U C Ad controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U Sc St and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right-hand side of the screen.
3	Select a TeSys U C Ad controller from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the starter-controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Right-click on the TeSys U Sc St module and select **Module Editor** to open its editor.  **Note:** The values in the **Configure Value** column represent default values.

Step	Action
6	Select the Parameters tab and in the **Configured Value** column, setup the parameters for: • local/remote control • communications loss fallback strategy • inversion of output • output LO1 • recovery mode • outputs OA1 and OA3 • outputs 13 and 23 Refer to the TeSys *LULC08 CANopen Communication Manual* (1744084) for additional information on setting up these parameters.
7	Assign labels for each of the parameters in the **User Defined Label** column (optional action). **Note:** There are no options to configure with this device.
8	Click on **OK** to save the parameter settings and return to the main menu.
9	Build and download the island configuration to the NIM.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U C Ad Data Process Image

Introduction

The output and input data process images for the TeSys U C Ad controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U C Ad Starter-Controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the starter-controller: ● Control of the system (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 8 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● Warning Register (that is, thermal warning) ● I/O Status on a controller base ● PKW request object for PKW service (2 words) ● PKW response data for PKW service (2 words)

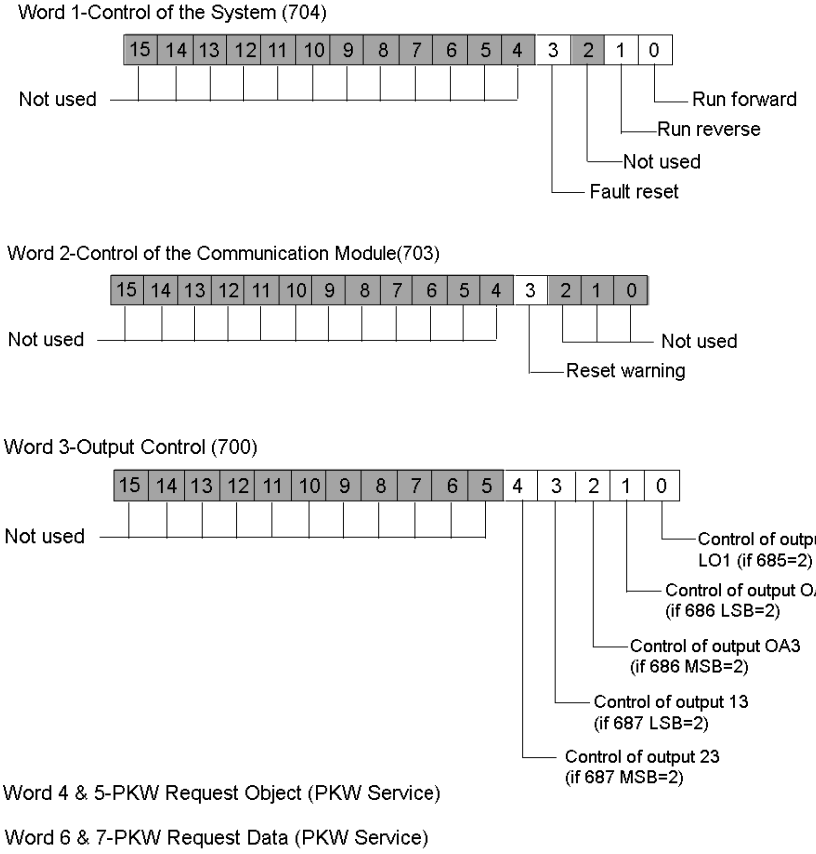
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U C Ad device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output and data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Run forward
Run reverse
Not used
Fault reset
Word 2-Control of the Communication Module(703)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Not used
Reset warning
Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (if 685=2)
Control of output OA1 (if 686 LSB=2)
Control of output OA3 (if 686 MSB=2)
Control of output 13 (if 687 LSB=2)
Control of output 23 (if 687 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

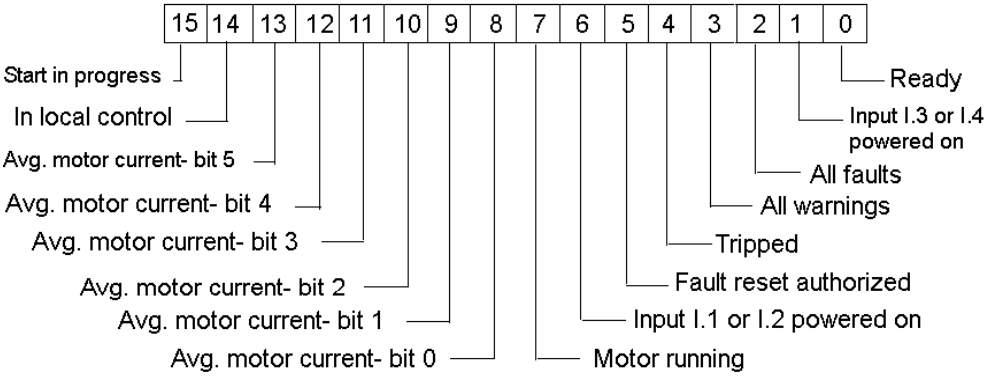
Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U Mu L device reports the position starter status information in 8 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

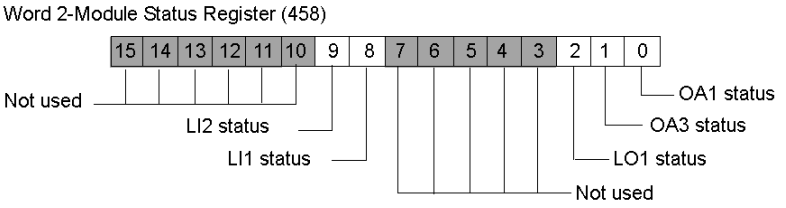
Representations of the input data process image are shown below.

Input Process Image

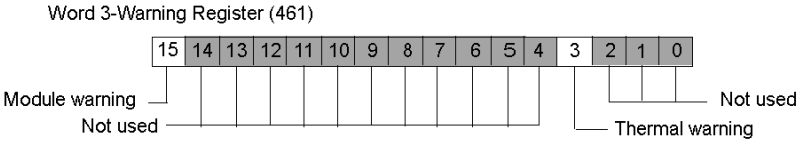
Word 1-Status Register (455)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
In local control
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Motor running
Input I.1 or I.2 powered on
Fault reset authorized
Tripped
All warnings
All faults
Input I.3 or I.4 powered on
Ready

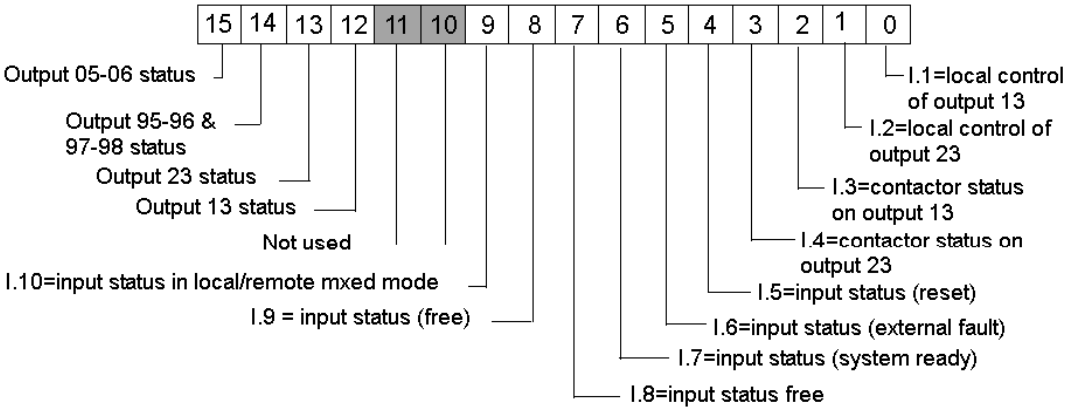
Word 2-Module Status Register (458)



Word 3-Warning Register (461)



Word 4-I/O status on a controller base (459)



Nord 5 & 6-PKW Request Object (PKW Service)

Nord 7 & 8-PKW Request Data (PKW Service)

10.7 CANopen TeSys U C Mu L

Overview

This section describes the CANopen TeSys U C Mu L variant of the TeSys U motor controller.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U C Mu L Controller	230
CANopen TeSys U C Mu L Data Process Image	235

Configuring the CANopen TeSys U C Mu L Controller

Introduction

The CANopen TeSys U **C Mu L** is the TeSys U **C**ontroller with **Mu**ltifunction Control Unit in **L**ocal mode variant of the TeSys U series of motor control devices.

You can use this variant when you need a motor-controller up to 450kW, for a 3-phase motor class 5-30, with an multifunction control unit that protects against overloads, short-circuits, phase imbalance, and insulation breaks. It also provides log and monitoring functions (including overtorque and no-load running), warnings, fault differentiation, and offers a manual or automatic reset.

Makeup of the CANopen TeSys U C Mu L

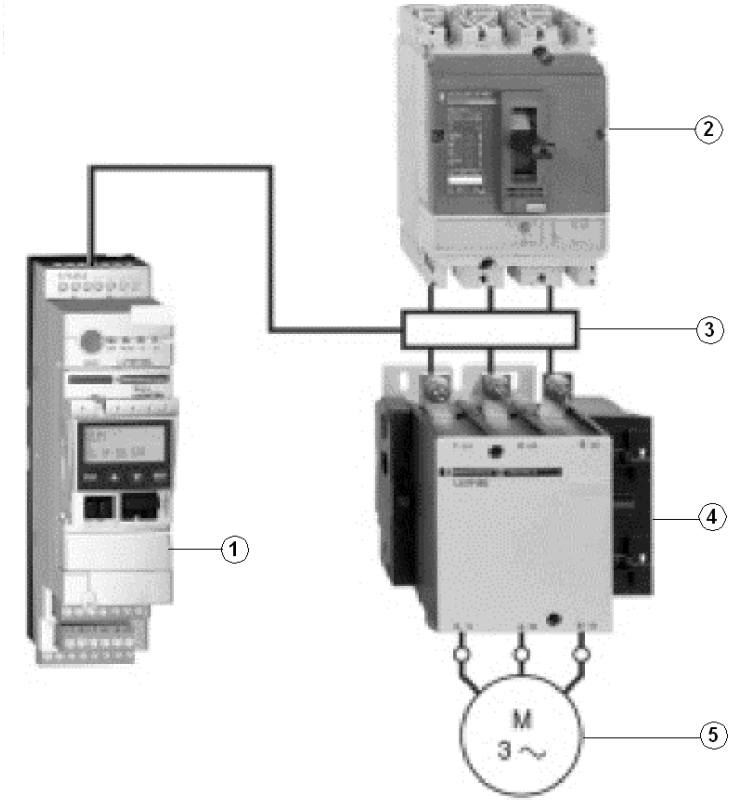
The makeup of the CANopen TeSys U C Mu L device described in this section uses an LUCMT1BL Multifunction Control Unit with either of the following power bases:

- LUTM10BL
- LUTM 20BL

The LULC08 CANopen communication module completes the configuration.

Typical Arrangement of a TeSys U C Mu L Motor Controller

A typical arrangement of a TeSys U C Mu L is shown in the below figure.



1 TeSys U C Mu L motor controller
2 short circuit protection device
3 current transformer
4 contactor
5 motor

When it is used with a short-circuit device and a contactor, as shown above, the TeSys U C Mu L controller creates a motor starter that provides:

- overload protection
- motor-starter control
- application monitoring

Above 32 A, the TeSys U C Mu L controller provides a motor starter management solution identical to that provided by TeSys U controllers described in Sections 10.2 through 10.5.

The Multifunction Control Unit

The LUCMT1BL Multifunction Control Unit controls, protects and monitors the LUTM bases *(see page 230)* and performs the following functions:

Protection

- against overcurrent
- against thermal overloads, with choice of trip classes from 5 to 30
- against ground faults
- against phase imbalances
- against mechanical jams during or after the start-up phase
- against idling
- against tripping of the starter via an external signal (as an option)

Warning

The LUCMT Multifunction Control Unit includes a warning associated with each of the above listed protection functions. The warning level can be configured and is independent from the protection trip level.

Diagnostic

Records and displays:

- number of operating hours for the motor
- number of starts
- number of trips
- cause of each trip

For the last five trips, the multifunction control unit records the status of the motor-starter at the time of the trip (value of currents, thermal status, and trip type).

When it is used with a short-circuit device and a contactor, as shown above, the TeSys U C Mu L controller creates a motor starter that provides:

- overload protection
- motor-starter control
- application monitoring

Conditions of Use

Irrespective of the nominal current value of the motor it is supposed to control, the TeSys U C Mu L controller is always used with an external current transformer whose:

- Secondary is at 1A nominal.
- Primary is selected according to the motor's nominal current.

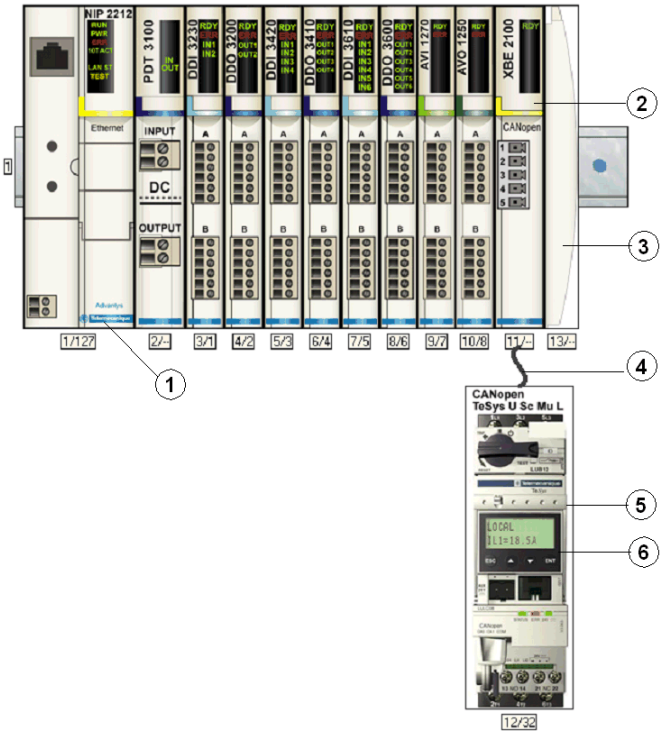
NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the PLC.

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U C Mu L on an STB island, you need to set the baud rate, node ID address and assemble the controller components *(see page 178)*.

Connecting to the STB Island

The TeSys U C Mu L motor controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys U C Mu L controller to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U C Mu L controller
6 display window and keypad

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U C Mu L and the Advantys STB island.

Step	Action
1	Start the ACS software. **Note:** There are no parameters and no options to configure for this device from within the ACS.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog browser on the right hand side of the screen.
3	Select a TeSys U Sc Mu L controller from the Enhanced CANopen section of the catalog browser.
4	An image of the controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Click on **OK** to save the configuration and return to the main menu.
6	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the controller in the ACS.

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U C Mu L motor controller.

Configuring the TeSys Sc Mu L Parameters

Next, use the built-in-display window/keypad on the front panel of the controller *(see page 233)* or a PC with the PowerSuite software to configure parameters within the TeSys U C Mu L.

NOTE: Remote mode is the Multifunction Control Unit's default mode of operation. You must use PowerSuite or the built-in-display to set the mode to Local. It is not possible to set parameters through the ACS.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U C Mu L Data Process Image

Introduction

The output and input data process images for the TeSys U C Mu L controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U C Mu L Controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 8 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● Warning Register (that is, thermal warning) ● Mechanical and Power Supply Status Register (that is, Contactor Position On) ● PKW request object for PKW service (2 words) ● PKW response data for PKW service (2 words)

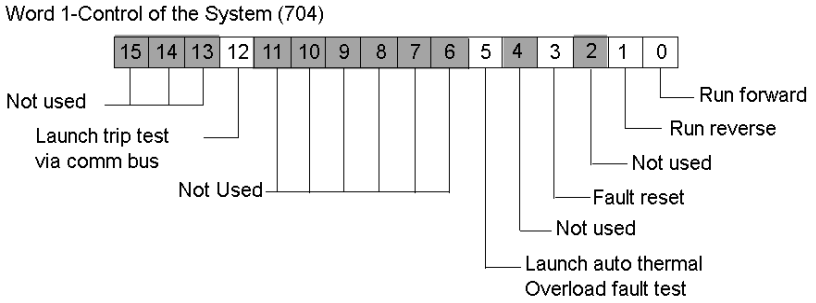
Output Data Process Image

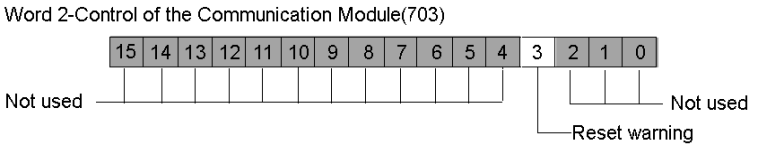
The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

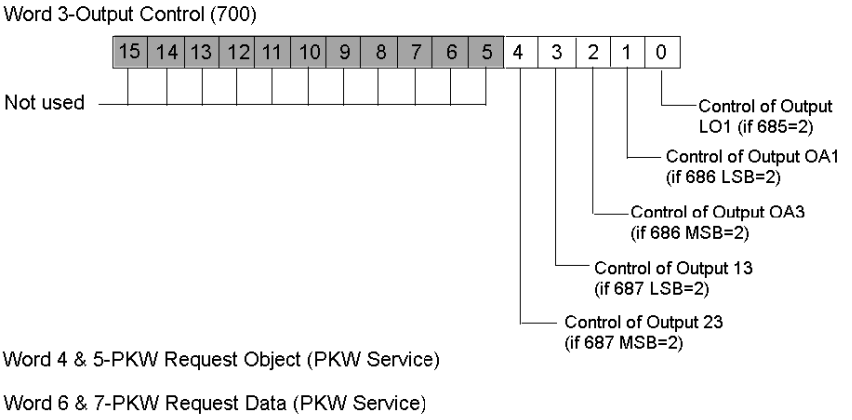
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U C Mu L device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data processs image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Launch trip test via comm bus
Not Used
Run forward
Run reverse
Not used
Fault reset
Not used
Launch auto thermal Overload fault test




Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of Output LO1 (if 685=2)
Control of Output OA1 (if 686 LSB=2)
Control of Output OA3 (if 686 MSB=2)
Control of Output 13 (if 687 LSB=2)
Control of Output 23 (if 687 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

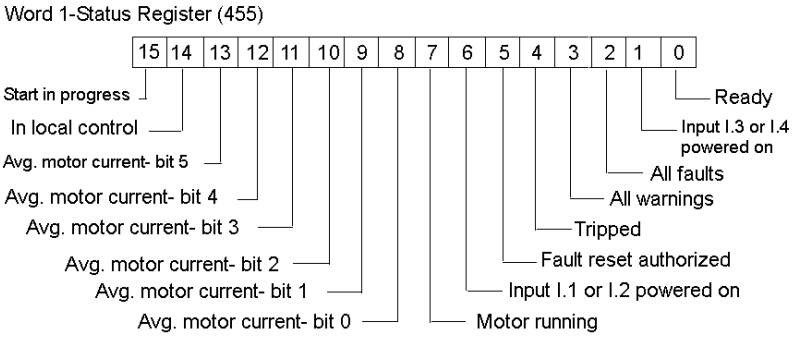
Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U C Mu L device reports the position starter status information in 8 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

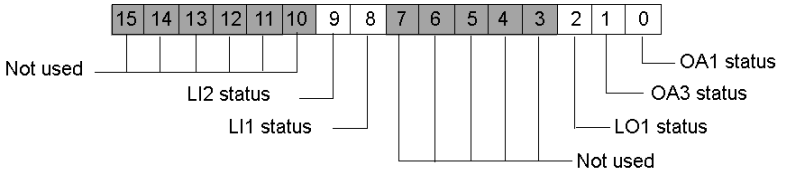
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

Representations of the input data process image are shown below.

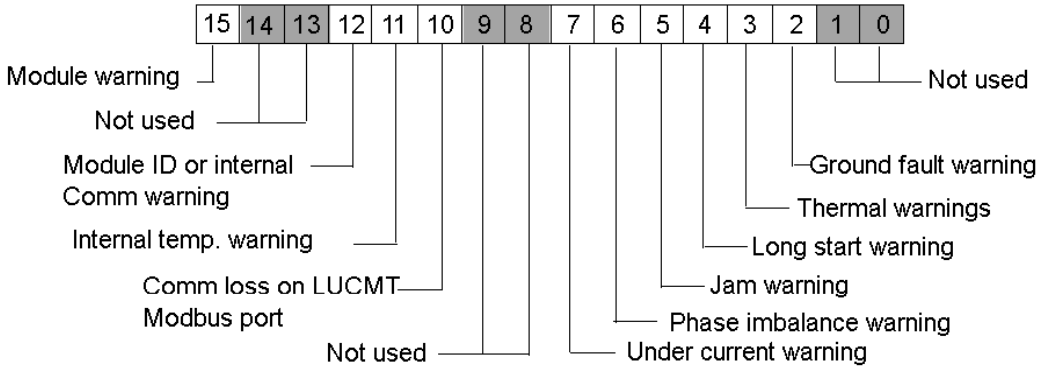
Input Process Image


Word 1-Status Register (455)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
In local control
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Ready
Input I.3 or I.4 powered on
All faults
All warnings
Tripped
Fault reset authorized
Input I.1 or I.2 powered on
Motor running

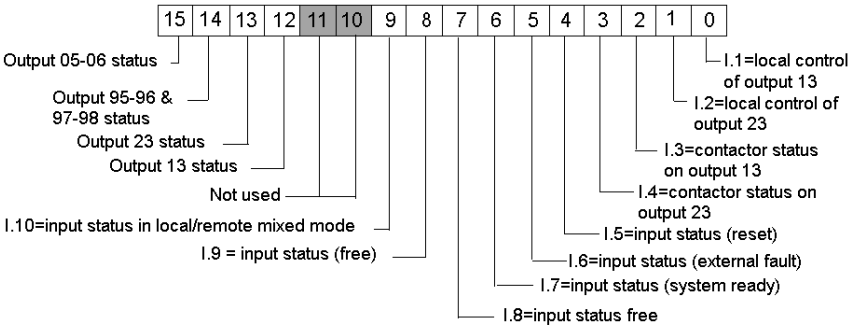
Word 2-Module Status Register (458)



Word 3-Warning Register (461)



Word 4-I/O status on a controller base (459)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Output 05-06 status
Output 95-96 & 97-98 status
Output 23 status
Output 13 status
Not used
I.10=input status in local/remote mixed mode
I.9 = input status (free)
I.1=local control of output 13
I.2=local control of output 23
I.3=contactor status on output 13
I.4=contactor status on output 23
I.5=input status (reset)
I.6=input status (external fault)
I.7=input status (system ready)
I.8=input status free

Word 5 & 6-PKW Request Object (PKW Service)

Word 7 & 8-PKW Request Data (PKW Service)

10.8 CANopen TeSys U C Mu R

Overview

This section describes the CANopen TeSys U C Mu R variant of the TeSys U motor controller.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys U C Mu R Controller	240
CANopen TeSys U C Mu R Data Process Image	245

Configuring the CANopen TeSys U C Mu R Controller

Overview

The CANopen TeSys U **C Mu R** is the TeSys U **C**ontroller with **Mu**ltifunction Control Unit in **R**emote mode variant of the TeSys U series of motor control devices.

You can use this variant when you need a motor-controller up to 450kW, for a 3-phase motor class 5-30, with an multifunction control unit that protects against overloads, short-circuits, phase imbalance, and insulation breaks. It also provides log and monitoring functions (including overtorque and no-load running), warnings, fault differentiation, and offers a manual or automatic reset.

Makeup of the CANopen TeSys U C Mu R

The makeup of the CANopen TeSys U C Mu R device described in this section uses an LUCMT1BL Multifunction Control Unit with either of the following power bases:

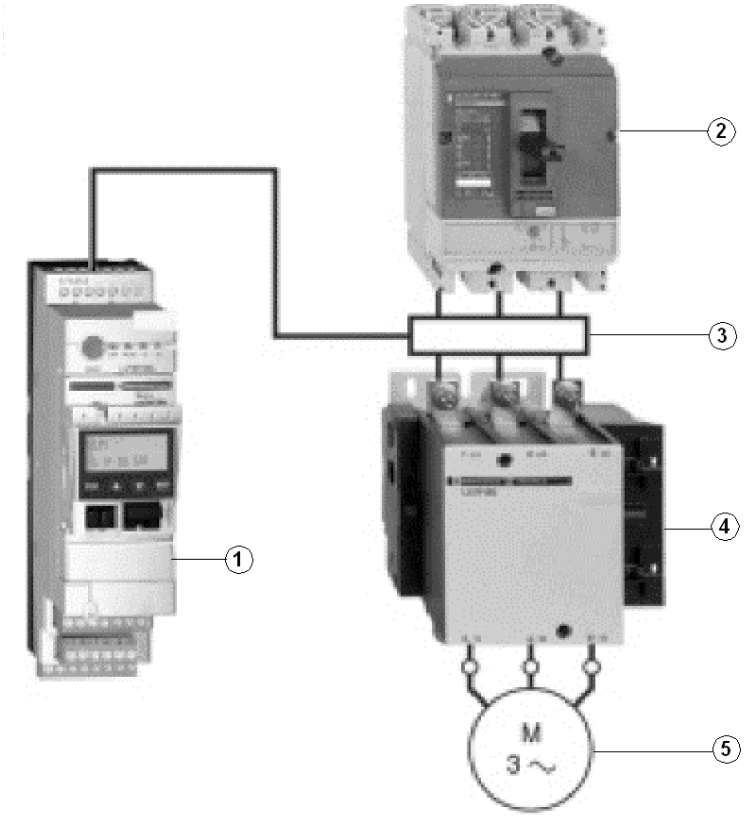
- LUTM10BL
- LUTM 20BL

The LULC08 CANopen communication module completes the configuration.

NOTE: Refer to the *Telemecanique TeSys U-Line Motor Starters catalogue* for correct matchup of control unit and power base.

Typical Arrangement of a TeSys U C Mu R Motor Controller

A typical arrangement of a TeSys U C Mu R is shown in the below figure.



1 TeSys U C Mu R motor controller
2 short circuit protection device
3 current transformer
4 contactor
5 motor

When it is used with a short-circuit device and a contactor, as shown above, the TeSys U C Mu R controller creates a motor starter that provides:

- overload protection
- motor-starter control
- application monitoring

Above 32 A, the TeSys U C Mu R controller provides a motor starter management solution identical to that provided by TeSys U controllers described in Sections 10.2 through 10.5.

The Multifunction Control Unit

The LUCMT1BL Multifunction Control Unit controls, protects and monitors the LUTM bases *(see page 240)* and performs the following functions:

Protection

- against overcurrent
- against thermal overloads, with choice of trip classes from 5 to 30
- against ground faults
- against phase imbalances
- against mechanical jams during or after the start-up phase
- against idling
- against tripping of the starter via an external signal (as an option)

Warning

The LUCMT Multifunction Control Unit includes a warning associated with each of the above listed protection functions. The warning level can be configured and is independent from the protection trip level.

Diagnostic

Records and displays:

- number of operating hours for the motor
- number of starts
- number of trips
- cause of each trip

For the last five trips, the multifunction control unit records the status of the motor-starter at the time of the trip (value of currents, thermal status, and trip type).

When it is used with a short-circuit device and a contactor, as shown above, the TeSys U C Mu R controller creates a motor starter that provides:

- overload protection
- motor-starter control
- application monitoring

Conditions of Use

Irrespective of the nominal current value of the motor it is supposed to control, the TeSys U C Mu R controller is always used with an external current transformer whose:

- Secondary is at 1A nominal.
- Primary is selected according to the motor's nominal current.

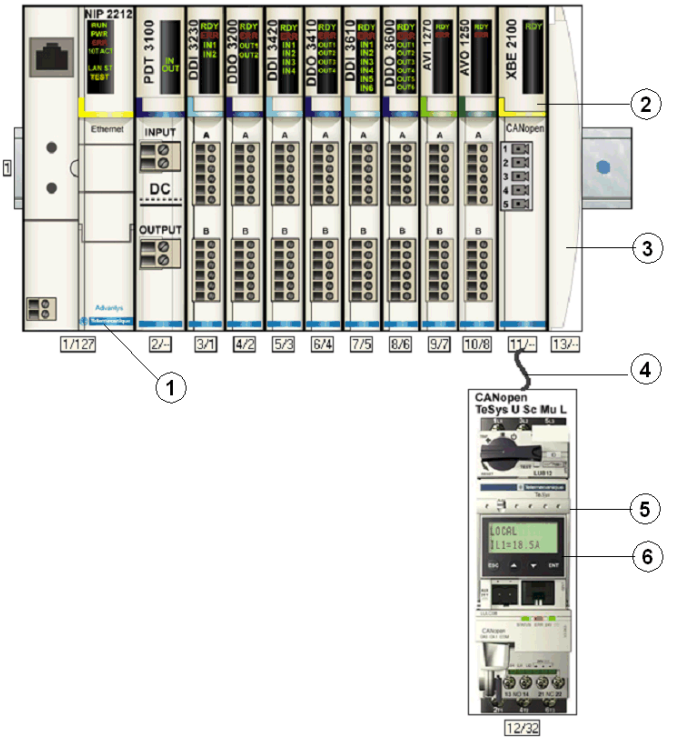
NOTE: In an installation containing TeSys U starter-controllers and TeSys U controllers, motor management is identical from the point-of-view of the PLC.

Preliminary Setup Requirements

Prior to using the Advantys STB Software (ACS) to configure the TeSys U C Mu R on an STB island, you need to set the baud rate, node ID address and assemble the controller components as described in Section 10.1 *(see page 178)*.

Connecting to the STB Island

The TeSys U C Mu R motor controller requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys U C Mu R controller to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys U C Mu R controller
6 display window and keypad

NOTE: You can use any standard Advantys STB NIM *(see page 177)* to control the TeSys U controller.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys U C Mu R and the Advantys STB island.

Step	Action
1	Start the ACS software. **Note:** There are no parameters and no options to configure for this device from within the ACS.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog browser on the right hand side of the screen.
3	Select a TeSys U Sc Mu L controller from the Enhanced CANopen section of the catalog browser.
4	An image of the controller connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure.
5	Click on **OK** to save the configuration and return to the main menu.
6	Build and download the island configuration to the NIM.

The LULC08 communication module connects to the CANopen bus through the XBE2100 module on your Advantys STB island. The baud rate must be set to 500Kbaud and the node ID set to the address you configured for the controller in the ACS.

Configuring the TeSys U C Mu R Parameters

Next, use the built-in-display window/keypad on the front panel of the controller *(see page 243)* or a PC with the PowerSuite software to configure parameters within the TeSys U C Mu R.

NOTE: Remote mode is the Multifunction Control Unit's default mode of operation. It is not possible to set parameters through the ACS.

A variety of available Schneider Electric documents *(see page 177)* contain detailed descriptions of TeSys U components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys U C Mu R Data Process Image

Overview

The output and input data process images for the TeSys U C Mu R controller are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys U Communications Variables User Manual* (1744802).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys U C Mu R Controller is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the controller: ● Control Register (that is, run forward, run reverse) ● Control of Communication Module (reset warning) ● Output Control (that is, control of output OA1) ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The starter then sends 8 words (input data process image) to the fieldbus master. ● Status Register (that is, ready, tripped) ● Module Status (that is, OA1 status) ● Warning Register (that is, thermal warning) ● Mechanical and Power Supply Status Register (that is, Contactor Position On) ● PKW request object for PKW service (2 words) ● PKW response data for PKW service (2 words)

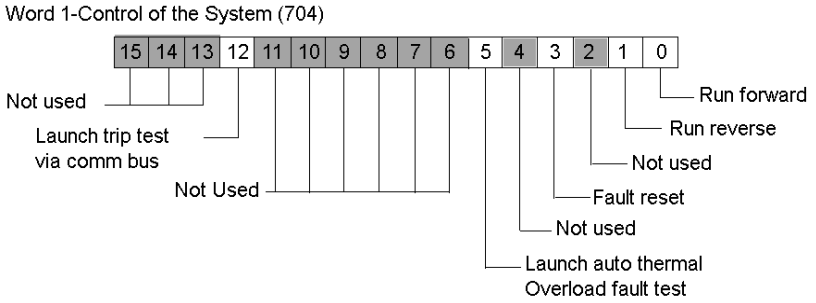
Output Data Process Image

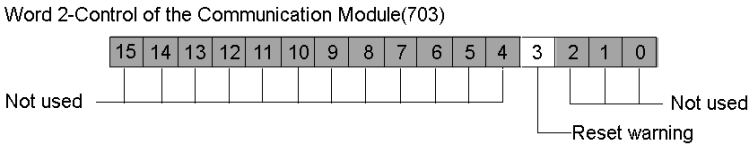
The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the test mode.

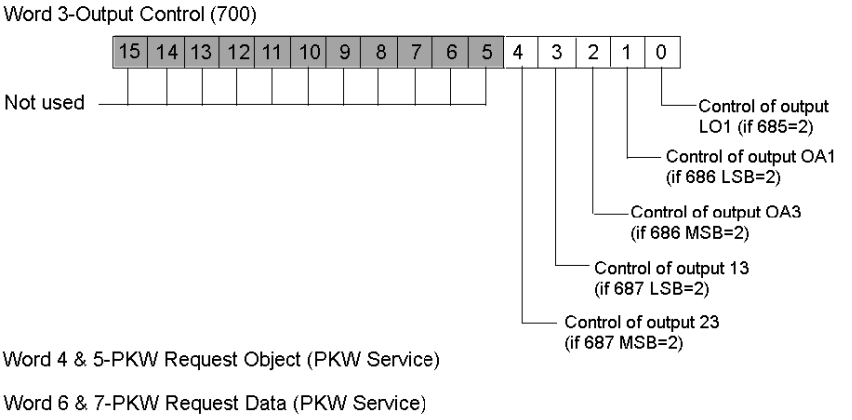
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys U C Mu R device uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Launch trip test via comm bus
Not Used
Run forward
Run reverse
Not used
Fault reset
Not used
Launch auto thermal Overload fault test




Word 3-Output Control (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Control of output LO1 (if 685=2)
Control of output OA1 (if 686 LSB=2)
Control of output OA3 (if 686 MSB=2)
Control of output 13 (if 687 LSB=2)
Control of output 23 (if 687 MSB=2)
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

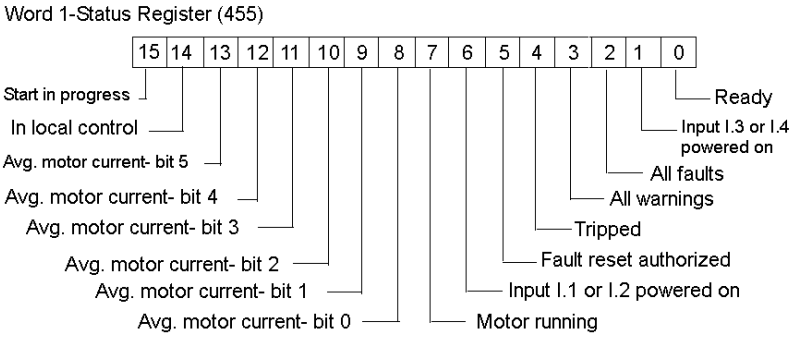
Input Data Process Image

Data from each input module on the island bus is represented in the NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487. The TeSys U C Mu R device reports the position starter status information in 8 contiguous registers in this block. (The exact registers in the process image vary, based on the module's node address on the island bus.) The input data process image can be read by:

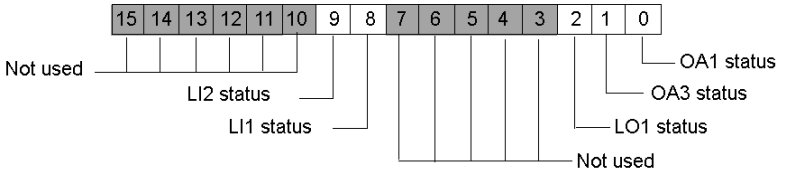
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

Representations of the input data process image are shown below.

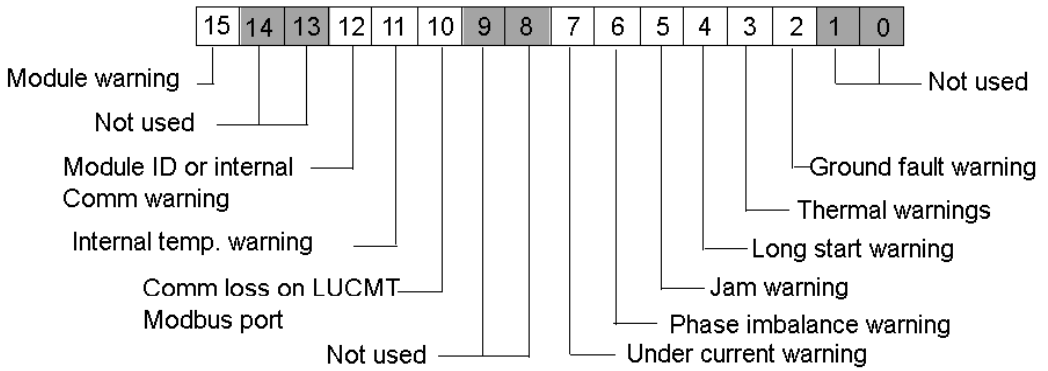
Input Process Image


Word 1-Status Register (455)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
In local control
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Ready
Input I.3 or I.4 powered on
All faults
All warnings
Tripped
Fault reset authorized
Input I.1 or I.2 powered on
Motor running

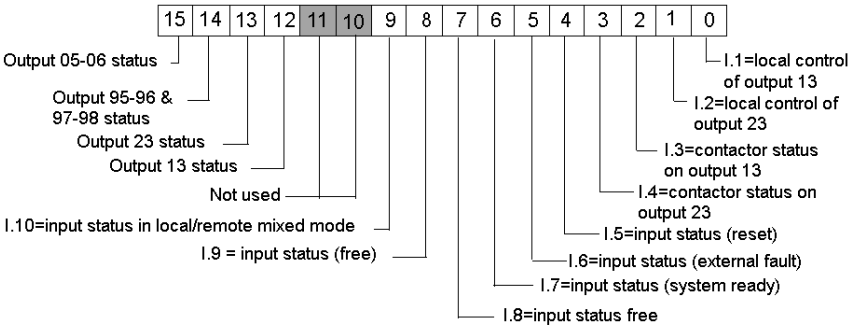
Word 2-Module Status Register (458)



Word 3-Warning Register (461)



Word 4-I/O status on a controller base (459)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Output 05-06 status
Output 95-96 & 97-98 status
Output 23 status
Output 13 status
Not used
I.10=input status in local/remote mixed mode
I.9 = input status (free)
I.1=local control of output 13
I.2=local control of output 23
I.3=contactor status on output 13
I.4=contactor status on output 23
I.5=input status (reset)
I.6=input status (external fault)
I.7=input status (system ready)
I.8=input status free

Word 5 & 6-PKW Request Object (PKW Service)

Word 7 & 8-PKW Request Data (PKW Service)

CANopen TeSys T Motor Management Controllers

11

Overview

This chapter describes Schneider Electric's TeSys T Motor Management Control (MMC), consisting of motor management controllers and expansion modules, used as enhanced CANopen devices on an Advantys STB island configuration.

What's in this Chapter?

This chapter contains the following sections:

Section	Topic	Page
11.1	Introduction to TeSys T MMC Devices	250
11.2	CANopen TeSys T L	256
11.3	CANopen TeSys T L (with Expansion Module)	264
11.4	CANopen TeSys T R	273
11.5	CANopen TeSys T R (with Expansion Module)	281

11.1 Introduction to TeSys T MMC Devices

Introduction

This section describes the makeup of a basic TeSys T MMC device and how it can be used as an enhanced CANopen device on an Advantys STB island configuration. Also, a description of the four varieties of TeSys T motor management devices is included at the end of the section

What's in this Section?

This section contains the following topics:

Topic	Page
TeSys T MMC Devices	251
The Four Varieties of TeSys T MMC Devices	255

TeSys T MMC Devices

System Overview

The TeSys T Motor Management Control (MMC) system consisting of controller and expansion module devices, provides protection, control, and monitoring capabilities for single-phase and 3-phase AC induction motors.

The system offers diagnostic and statistical functions, as well as configurable warnings and faults. These features allow better prediction of component maintenance, and provide data to continuously improve the entire system.

The system can be configured and controlled using an HMI device, a PC with PowerSuite configuration software, or remotely over the network using a PLC.

Components such as external load current transformers and ground current transformers provide additional range to the system.

Main Components

The two main hardware components of the TeSys T system are:
- LTMR controller
- LTME expansion module

The microprocessor-based LMTR controller is the central component in the system and the expansion module provides additional functionality when it is installed with the controller.

LMTR Controller

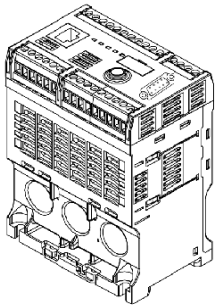
The microprocessor-based LMTR controller manages the control, protection and monitoring functions of single-phase and 3-phase AC induction motors.

The LMTR control functions include:
- control channels (local/remote control source selection)
- operating modes
- fault management

The LMTR protection functions include:
- thermal motor protection
- current motor protection
- voltage and power motor protection

The LMTR metering and monitoring functions include:
- measurement
- fault and warning counters
- system and device monitoring faults
- motor history
- system operating status

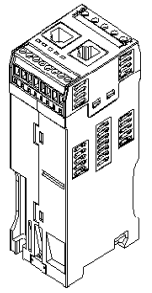
The main features of the LTMR controller are described below.

LTM R controller	Functional Description	Reference Number
	• current sensing 0.4...100 A • single-phase or 3-phase current inputs • 6 discrete logic inputs • 4 relay outputs: 3 SPST, 1 DPST • connections for a ground current sensor • connection for a motor temperature sensor • connection for network • connection for HMI device or expansion module • current protection, metering and monitoring functions • motor control functions • power indicator • fault and warning LED indicators • network communication and alarm indicators • HMI communication LED indicator • test and reset function	LTMR08CBD (24 Vdc, 0.4...8 A FLC) LTMR27CBD (24 Vdc, 1.35...27 A FLC) LTMR100CBD (24 Vdc, 5...100 A FLC) LTMR08CFM (100...240 Vac, 0.4...8 A FLC) LTMR27CFM (100...240 Vac, 1.35...27 A FLC) LTMR100CFM (100...240 Vac, 5...100 A FLC)

LTME Expansion Module

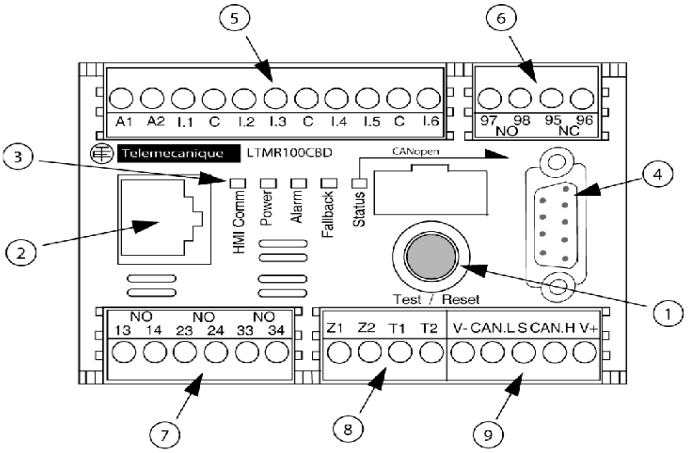
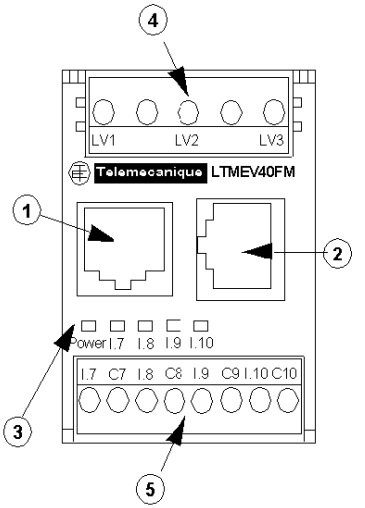
The LTME Expansion Module provides additional functionally when utilized with the LTMR Controller. It is powered from the controller and provides voltage monitoring and additional input terminals.

The main features of the LTME Expansion Module are described below.

LTM E Expansion Module	Functional Description	Reference Number
	• voltage sensing 110...690 Vac • 3-phase voltage inputs • 4 additional discrete logic inputs • additional voltage protection, metering and monitoring functions • power LED indicator • logic input status LED indicators	LTMEV40BD (24 Vdc) LTMEV40FM (100...240 Vac)
	Additional components required for an optional expansion module: • LTM R controller to LTM E connection cable	LTMCC004(0.4m)

Controls, Indicators, & Connectors

The following diagrams show the features of the LTMR controller and LTME Expansion Module.

LTM R Controller	LTM E Expansion Module
	
1 test/reset button **2** HMI port with RJ45 connector connecting the LTM R controller to an HMI, PC, or expansion module **3** status-indicating LEDs **4** network port with 9-pin sub-D connector connecting the LTM R controller to a CANopen network **5** plug-in terminal: control power, and internally powered logic inputs and commons **6** plug-in terminal: double pole/single throw (DPST) output relay **7** plug-in terminal output relay **8** plug-in terminal: ground fault input and temperature sensor input **9** plug-in terminal: PLC network	**1** port with RJ45 connector to HMI or PC **2** port with RJ45 connector to LTM R controller **3** status-indicating LEDs **4** plug-in terminal: voltage inputs **5** plug-in terminal: logic inputs and common

The CANopen Connection

The TeSys T MMC is designed to work over various fieldbus protocols; one of which is CANopen, and is the one this chapter focuses on. It describes the Telemecanique TeSys T MMC as an enhanced CANopen device on an Advantys STB island configuration. The chapter covers the configuration of the internal CANopen communications port for each of the four different variants of the TeSys T MMC.

Additional Information

Detailed descriptions of TeSys T MMC components, wiring, LED patterns, set-up procedures and functionality can be found in the following Schneider Electric documents:

- TeSys T CANopen Users Manual (1639503)
- TeSys T Installation Guide (1639508)
- TeSys T CANopen Quick Start Guide (1639574)
- TeSys T MMC Custom Logic Users Manual (1639507)
- TeSys T MMC Addendum to Users Manual (1639583)
- PowerSuite Instruction Sheet (1494182)

The Four Varieties of TeSys T MMC Devices

TeSys T MMC Variations

The TeSys T MMC appears in the form of four variants in the Advantys Configuration Software (ACS) as listed below:

- TeSyS T MMC L
- TeSyS T MMC L EV40
- TeSyS T MMC R
- TeSyS T MMC R EV40

Each of these variants is identified by the configuration mode of the controller, either **L**ocal or **R**emote, and the presence or absence of an EV40 expansion module.

Use of PowerSuite

Each of the TeSys T variants is configured as an enhanced CANopen device by using the PowerSuite configuration software ver. 2.5(or greater) with the LTM_CONF ver.4.5.0.6 add-on. This is used to configure basic settings such as the node ID and baud rate as well as all warning and fault parameter levels.

NOTE: There are NO configurable parameters that are accomplished using the ACS. Any parameter changes outside of PowerSuite must be done vial PKW objects over the fieldbus.

Applicable Advantys NIMs

You can use any of the following standard Advantys STB Network Interface Modules (NIMs) with the indicated firmware version to control TeSys T MMC devices.

Fieldbus	Advantys Part Number	Minimum FW Version Number
InterBus	STBNIB2212	2.02
CANopen	STBNCO2212	2.02
Profibus	STBNDP2212	2.04
Fipio	STBNFP2212	2.03
Ethernet TCP/IP	STBNIP2212	2.1.4
EtherNet/IP	STBNIC2212	2.xx
DeviceNet	STBNDN2212	2.04
Modbus Plus	STBNMP2212	2.02

11.2 CANopen TeSys T L

Overview

This section describes the CANopen TeSys T L (without expansion module) variant of a TeSys T Motor Management Controller device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys T L	257
CANopen TeSys T L Data Process Image	260

Configuring the CANopen TeSys T L

Introduction

The CANopen TeSys T L is the TeSys T Motor Management Controller (MMC), without an expansion module, operating in the Local configuration mode. It is the TeSys T L variant of the TeSys T series of MMC devices.

Select one of the following MMC types:

- LTMR++C** where ++ = 08 or 27 or 100 and ** = FM or BD

Preliminary Setup Requirements

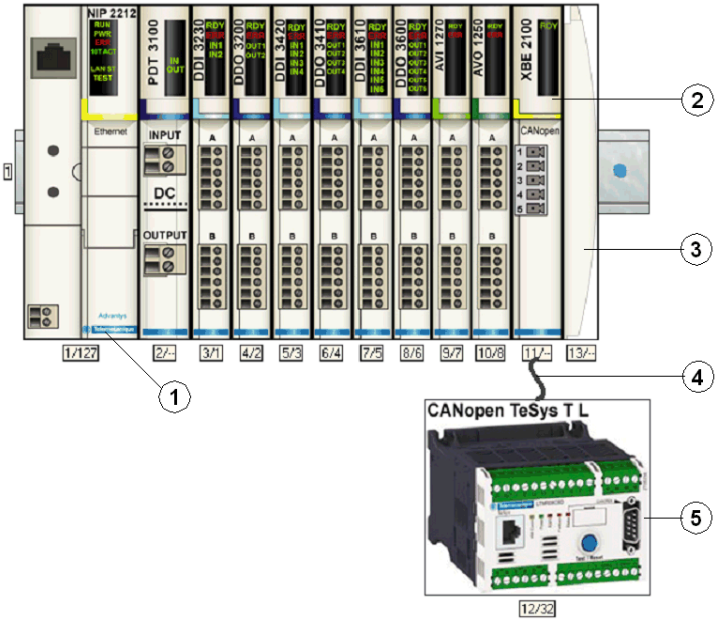
Prior to using the Advantys STB Software (ACS) to configure the TeSys T L on an STB island you need to set the baud rate and node ID address as well as all warning and fault parameter levels. You do this with the PowerSuite configuration software-refer to the *PowerSuite Instruction Sheet 1494182*.

NOTE: The set-up for performing the baud rate and the node ID procedures are defined in the *TeSys T User Manual* (1639503).

NOTE: Remote configuration mode is the default mode of operation. You must use PowerSuite to set the mode to Local. It is not possible to set any parameters for the MMC with the ACS.

Connecting to the STB Island

The TeSys T L requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys T L to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys T L MMC

NOTE: You can use any standard Advantys STB NIM *(see page 255)* to control the TeSys T MMC.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys T L and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys T L from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the TeSys T L connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure *(see page 258)*.
5	Click on **OK** to save the parameter settings and return to the main menu.
6	Build and download the island configuration to the NIM.

A variety of available Schneider Electric documents *(see page 254)* contain detailed descriptions of TeSys T components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys T L Data Process Image

Introduction

The output and input data process images for the TeSys T L MMC are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the fieldbus master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys T CANopen User Manual* (1639503).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys T L MMC is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the MMC: ● control of the system (that is, run forward, run reverse) ● control of Analog Output 1 (reserved for future use) ● output control of Boolean Outputs ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The MMC then sends 8 words (input data process image) to the fieldbus master. ● Status Register 1(that is, ready, tripped) ● Status Register 2(that is, HMI port comm. loss) ● logic input status (that is, Input Status 1) ● logic output status (that is, Output Status 1) ● PKW response object for PKW service (2 words) ● PKW response data for PKW service (2 words)

NOTE: The process images are the same for STB islands containing TeSys T MMCs with or without an expansion module. In order to receive input data from the expansion module, PKW objects must be used. For details on PKW objects, refer to the *Advantys Configuration Software Help files*.

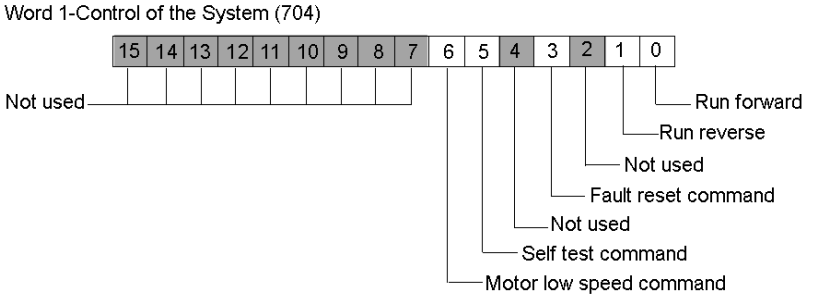
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the Test mode.

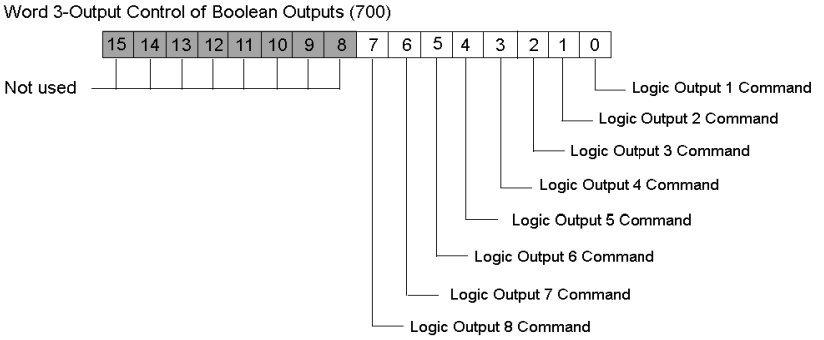
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys T L MMC uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output and data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Run forward
Run reverse
Not used
Fault reset command
Not used
Self test command
Motor low speed command

Word 2-Control of Analog Output 1 (706) - (reserved for future use)


Word 3-Output Control of Boolean Outputs (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Logic Output 1 Command
Logic Output 2 Command
Logic Output 3 Command
Logic Output 4 Command
Logic Output 5 Command
Logic Output 6 Command
Logic Output 7 Command
Logic Output 8 Command

Word 4 & 5-PKW Request Object (PKW Service)

Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

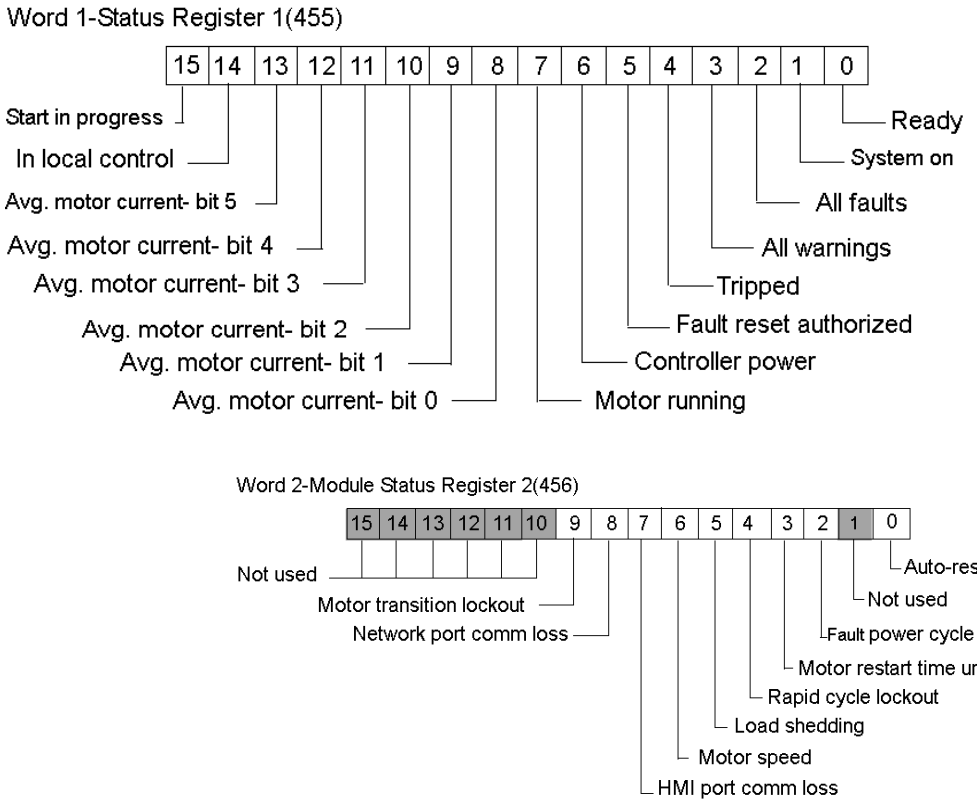
The TeSys T L MMC sends status data of the motor in control to the island's NIM. The NIM stores the information in 8 contiguous 16-bit registers. The input data process image can be read by:

- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

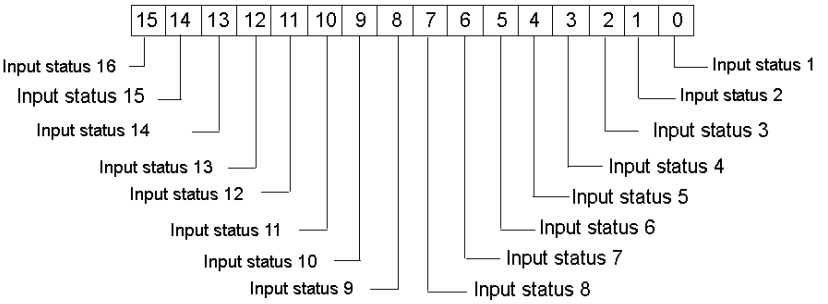
The NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487 that represents the data returned the NIM. Each input module on the island bus is represented in this data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the input data process image are shown below.

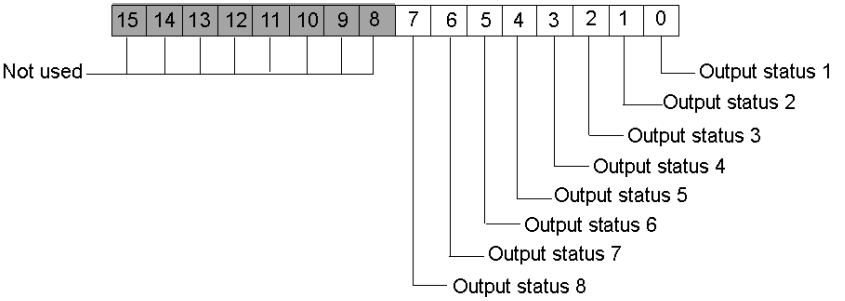
Input Process Image


Word 1-Status Register 1(455)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Start in progress
In local control
Avg. motor current- bit 5
Avg. motor current- bit 4
Avg. motor current- bit 3
Avg. motor current- bit 2
Avg. motor current- bit 1
Avg. motor current- bit 0
Ready
System on
All faults
All warnings
Tripped
Fault reset authorized
Controller power
Motor running
Word 2-Module Status Register 2(456)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Motor transition lockout
Network port comm loss
Auto-reset active
Not used
Fault power cycle requested
Motor restart time undefined
Rapid cycle lockout
Load shedding
Motor speed
HMI port comm loss

Word 3-Logic Input Status (457)



Word 4-Logic Output Status (458)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Output status 8
Output status 7
Output status 6
Output status 5
Output status 4
Output status 3
Output status 2
Output status 1

Word 5 & 6-PKW Response Object (PKW Service)

Word 7 & 8-PKW Response Data (PKW Service)

11.3 CANopen TeSys T L (with Expansion Module)

Overview

This section describes the CANopen TeSys T L (with expansion module) variant of a TeSys T Motor Management Controller device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys T L (with Expansion Module)	265
CANopen TeSys T L (with Expansion Module) Data Process Image	268

Configuring the CANopen TeSys T L (with Expansion Module)

Introduction

The CANopen TeSys T L is the TeSys T MMC, with an expansion module, operating in the Local mode. It is the TeSys T L (with Expansion Module) variant of the TeSys T series of MMC devices.

Select one of the following MMC types:

- LTMR++C** where ++ = 08 or 27 or 100 and ** = FM or BD
- LTMEV40** Expansion Module

Preliminary Setup Requirements

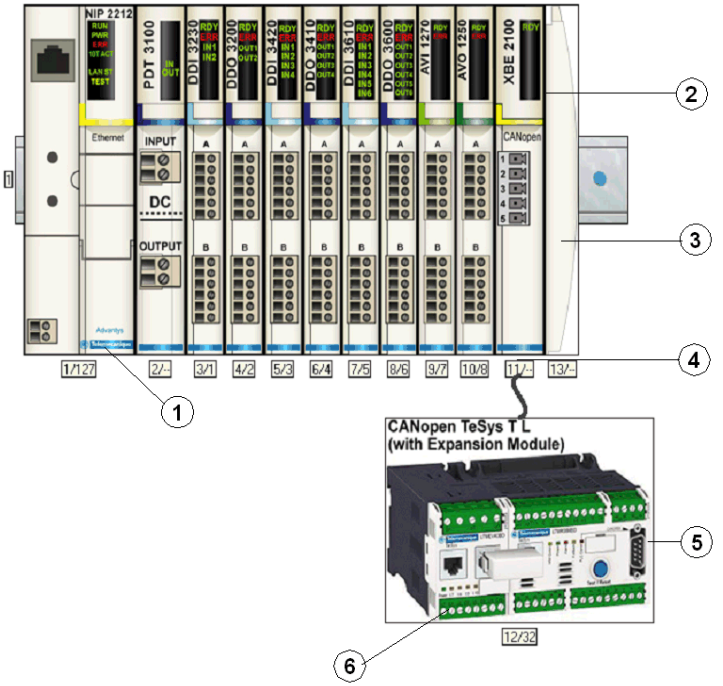
Prior to using the Advantys STB Software (ACS) to configure the TeSys T L (with Expansion Module) on an STB island you need to set the baud rate and node ID address as well as all warning and fault parameter levels. You do this with the PowerSuite configuration software. Refer to the *PowerSuite Instruction Sheet* (1494182).

NOTE: The set-up for performing the baud rate and the node ID procedure are defined in the *TeSys T User Manual* (1639503).

NOTE: Remote configuration mode is the default mode of operation. You must use PowerSuite to set the mode to Local. It is not possible to set any parameters for the MMC with the ACS.

Connecting to the STB Island

The TeSys T L (with Expansion Module) requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys T L to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys T L MMC
6 expansion module

NOTE: You can use any standard Advantys STB NIM *(see page 177)*to control the TeSys T MMC.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys T L and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys T L (with expansion module) from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the TeSys T L (with expansion module) connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure *(see page 266)*.
5	Click on **OK** to save the parameter settings and return to the main menu.
6	Build and download the island configuration to the NIM.

A variety of available Schneider Electric documents *(see page 254)* contain detailed descriptions of TeSys T components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys T L (with Expansion Module) Data Process Image

Introduction

The output and input data process images for the TeSys T L MMC (with expansion module) are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the fieldbus master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys T CANopen User Manual* (1639503).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys T L MMC (with expansion module) is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the MMC: ● control of the system (that is, run forward, run reverse) ● control of Analog Output 1 (reserved for future use) ● output control of Boolean Outputs ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The MMC then sends 8 words (input data process image) to the fieldbus master. ● Status Register 1 (that is, ready, tripped) ● Status Register 2 (that is, HMI port comm. loss) ● logic input status (that is, Input Status 1) ● logic output status (that is, Output Status 1) ● PKW response object for PKW service (2 words) ● PKW response data for PKW service (2 words)

NOTE: The process images are the same for STB islands containing TeSys T MMCs with or without an expansion module. In order to receive input data from the expansion module, PKW objects must be used. For details on PKW objects, refer to the *Advantys Configuration Software Help files*.

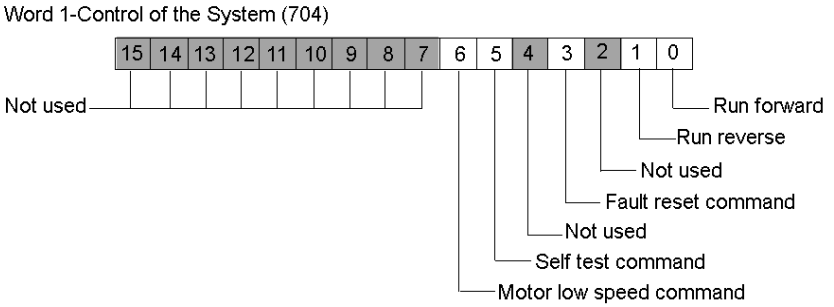
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online in the Local mode.

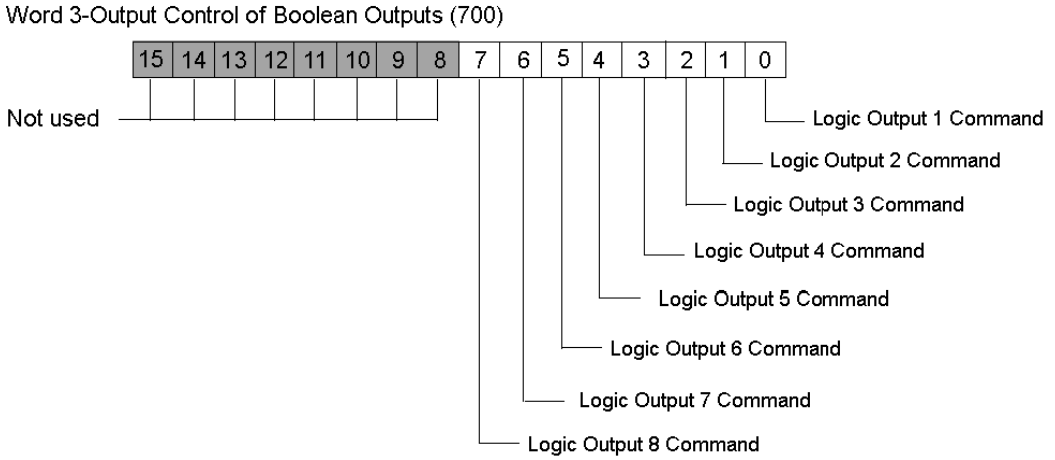
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys T L MMC (with expansion module) uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output and data process image are shown below.

Output Process Image



Word 2- Control of Analog Output 1 (706) (reserved for future use)


Word 3-Output Control of Boolean Outputs (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Logic Output 1 Command
Logic Output 2 Command
Logic Output 3 Command
Logic Output 4 Command
Logic Output 5 Command
Logic Output 6 Command
Logic Output 7 Command
Logic Output 8 Command

Word 4 & 5-PKW Request Object (PKW Service)

Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

The TeSys T L MMC (with expansion module) sends status data of the motor in control to the island's NIM. The NIM stores the information in 8 contiguous 16-bit registers.The input data process image can be read by:

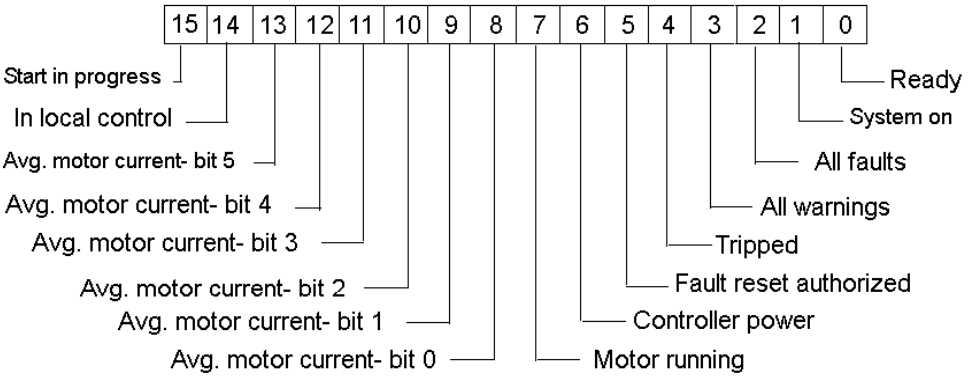
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

The NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487 that represents the data returned the NIM. Each input module on the island bus is represented in this data block. Their specific positions in the process image are based on the module's node address on the island bus.

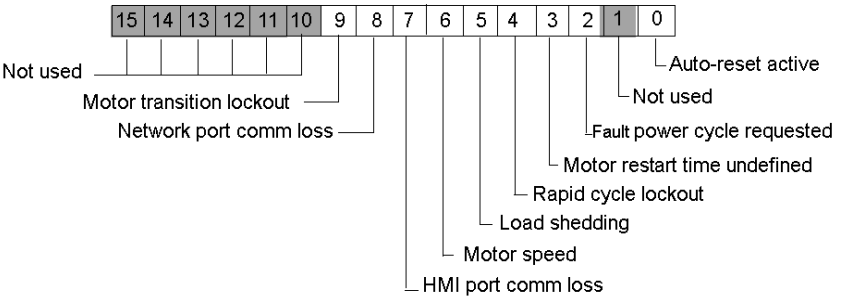
Representations of the input data process image are shown below.

Input Process Image

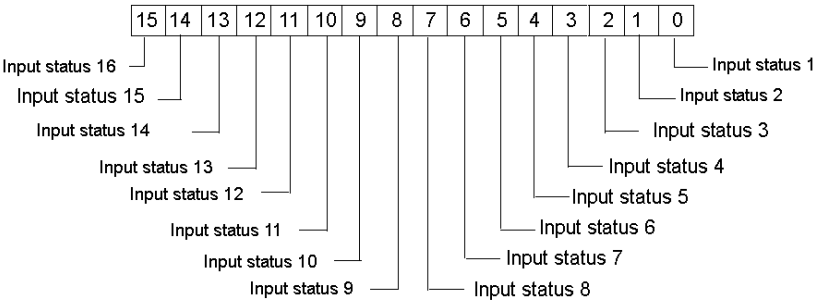
Word 1-Status Register 1(455)



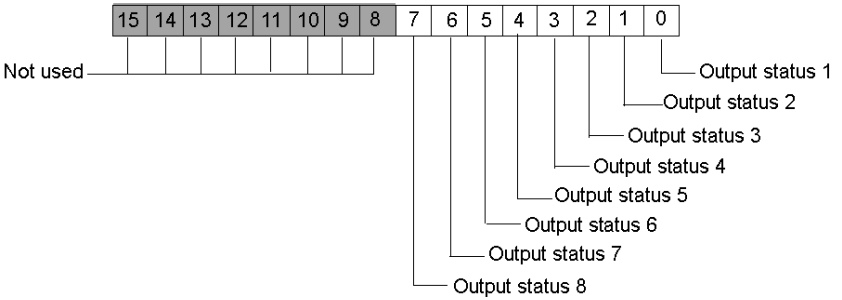
Word 2-Module Status Register 2(456)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Motor transition lockout
Network port comm loss
HMI port comm loss
Motor speed
Load shedding
Rapid cycle lockout
Motor restart time undefined
Fault power cycle requested
Not used
Auto-reset active

Word 3-Logic Input Status (457)



Word 4-Logic Output Status (458)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Output status 1
Output status 2
Output status 3
Output status 4
Output status 5
Output status 6
Output status 7
Output status 8

Word 5 & 6-PKW Response Object (PKW Service)

Word 7 & 8-PKW Response Data (PKW Service)

11.4 CANopen TeSys T R

Overview

This section describes the CANopen TeSys T R variant of a TeSys T Motor Management Controller device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys T R	274
CANopen TeSys T R Data Process Image	277

Configuring the CANopen TeSys T R

Introduction

The CANopen TeSys T R is the TeSys T MMC, without an expansion module, operating in the Remote mode. It is the TeSys T R variant of the TeSys T series of MMC devices.

Select one of the following MMC types:

- LTMR++C** where ++ = 08 or 27 or 100 and ** = FM or BD

Preliminary Setup Requirements

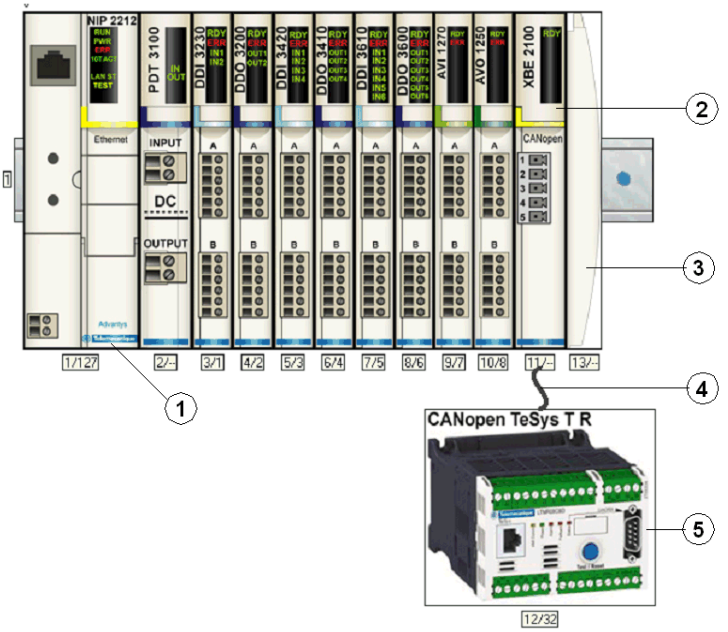
Prior to using the Advantys STB Software (ACS) to configure the TeSys T R on an STB island you need to set the baud rate and node ID address as well as all warning and fault parameter levels. You do this with the PowerSuite configuration software. Refer to the *PowerSuite Instruction Sheet* (1494182).

NOTE: The set-up for performing the baud rate and the node ID procedures are defined in the *TeSys T User Manual* (1639503).

NOTE: Remote configuration mode is the default mode of operation. You must use PowerSuite to set the mode to Local. It is not possible to set any parameters for the MMC with the ACS.

Connecting to the STB Island

The TeSys T R requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys T R to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys T R MMC

NOTE: You can use any standard Advantys STB NIM *(see page 177)*to control the TeSys T MMC.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys T L and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys T R from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the TeSys T R connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure *(see page 275)*.
5	Click on **OK** to save the parameter settings and return to the main menu.
6	Build and download the island configuration to the NIM.

A variety of available Schneider Electric documents *(see page 254)* contain detailed descriptions of TeSys T components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys T R Data Process Image

Overview

The output and input data process images for the TeSys T R MMC are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the fieldbus master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys T CANopen User Manual* (1639503).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys T R MMC is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the MMC: ● control of the system (that is, run forward, run reverse) ● Control of Analog Output 1 (reserved for future use) ● output control of Boolean Outputs ● PKW request object for PKW service (2 words) ● PKW request data for PKW service (2 words)
2	The MMC then sends 8 words (input data process image) to the fieldbus master. ● Status Register 1(that is, ready, tripped) ● Status Register 2 (that is, HMI port comm. loss) ● logic input status (that is, Input status 1) ● logic output status (that is, Output status 1) ● PKW response object for PKW service (2 words) ● PKW response data for PKW service (2 words)

NOTE: The process images are the same for STB islands containing TeSys T MMCs with or without an expansion module. In order to receive input data from the expansion module, PKW objects must be used. For details on PKW objects, refer to the *Advantys Configuration Software Help files*.

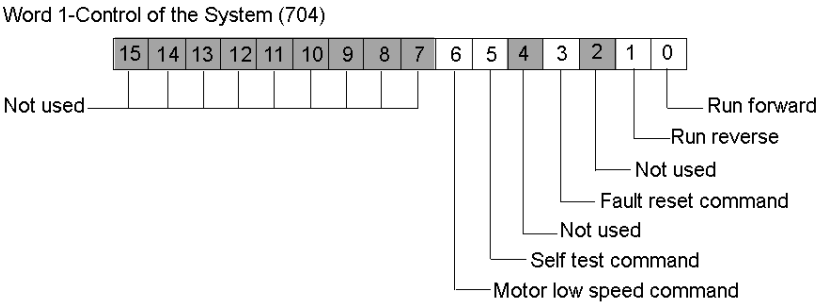
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online and in the Test mode.

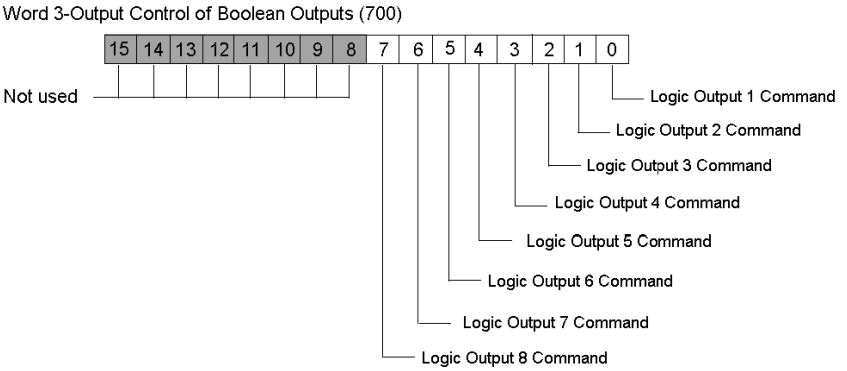
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys T R MMC uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output and data process image are shown below.

Output Process Image


Word 1-Control of the System (704)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Run forward
Run reverse
Not used
Fault reset command
Not used
Self test command
Motor low speed command

Word 2-Control of Analog Output 1 (706) (reserved for future use)


Word 3-Output Control of Boolean Outputs (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Logic Output 1 Command
Logic Output 2 Command
Logic Output 3 Command
Logic Output 4 Command
Logic Output 5 Command
Logic Output 6 Command
Logic Output 7 Command
Logic Output 8 Command

Word 4 & 5-PKW Request Object (PKW Service)

Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

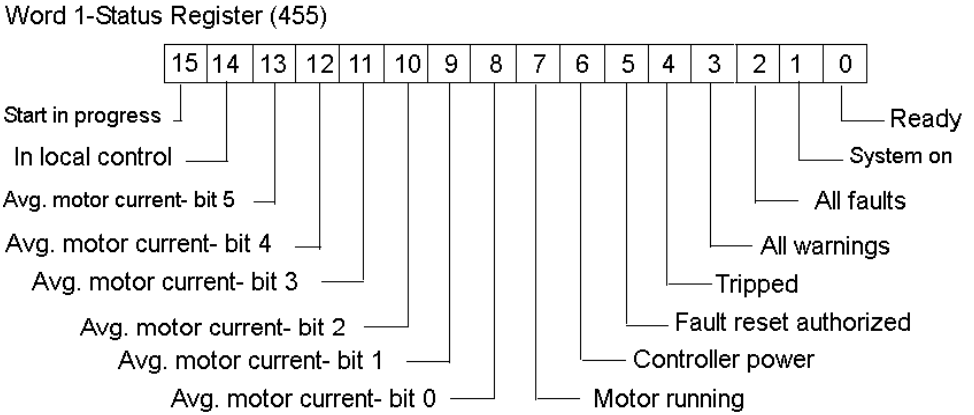
The TeSys T R MMC sends status data of the motor in control to the island's NIM. The NIM stores the information in 8 contiguous 16-bit registers.The input data process image can be read by:

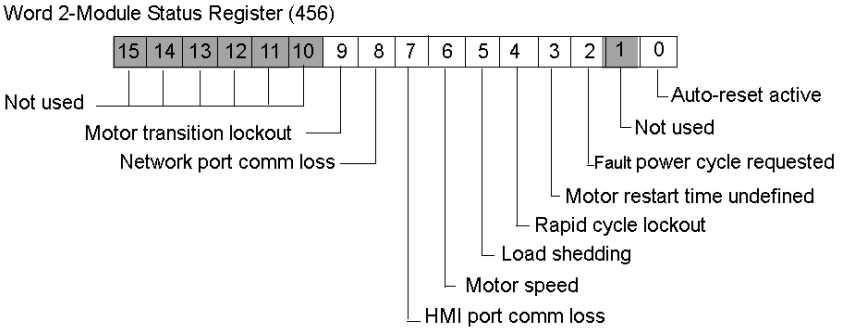
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

The NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487 that represents the data returned the NIM. Each input module on the island bus is represented in this data block. Their specific positions in the process image are based on the module's node address on the island bus.

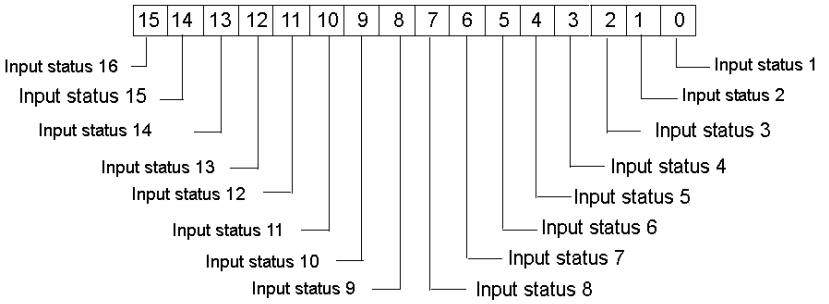
Representations of the input data process image are shown below.

Input Process Image

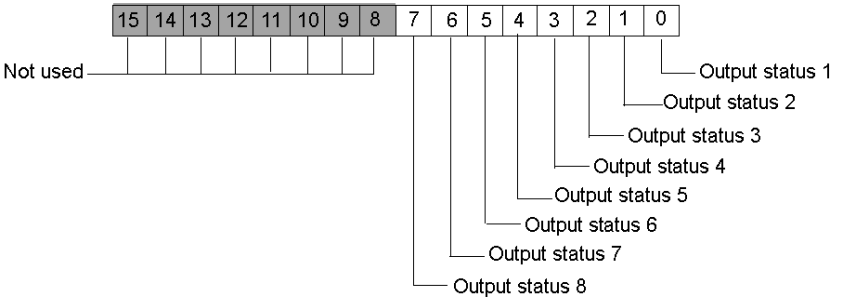



Word 2-Module Status Register (456)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Motor transition lockout
Network port comm loss
Auto-reset active
Not used
Fault power cycle requested
Motor restart time undefined
Rapid cycle lockout
Load shedding
Motor speed
HMI port comm loss

Word 3-Logic Input Status (457)



Word 4-Logic Output Status (458)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Output status 8
Output status 7
Output status 6
Output status 5
Output status 4
Output status 3
Output status 2
Output status 1

Word 5 & 6-PKW Response Object (PKW Service)

Word 7 & 8-PKW Response Data (PKW Service)

11.5 CANopen TeSys T R (with Expansion Module)

Overview

This section describes the CANopen TeSys T R (with Expansion Module) variant of a TeSys T Motor Management Controller device.

What's in this Section?

This section contains the following topics:

Topic	Page
Configuring the CANopen TeSys T R (with Expansion Module)	282
CANopen TeSys T R (with Expansion Module) Data Process Image	285

Configuring the CANopen TeSys T R (with Expansion Module)

Introduction

The CANopen TeSys T R (with Expansion Module) is the TeSys T MMC, with an expansion module, operating in the Remote mode. It is the TeSys T R (with Expansion Module) variant of the TeSys T series of MMC devices.

Select one of the following MMC types:

- LTMR++C** where ++ = 08 or 27 or 100 and ** = FM or BD
- LTMEV40**Expansion Module

Preliminary Setup Requirements

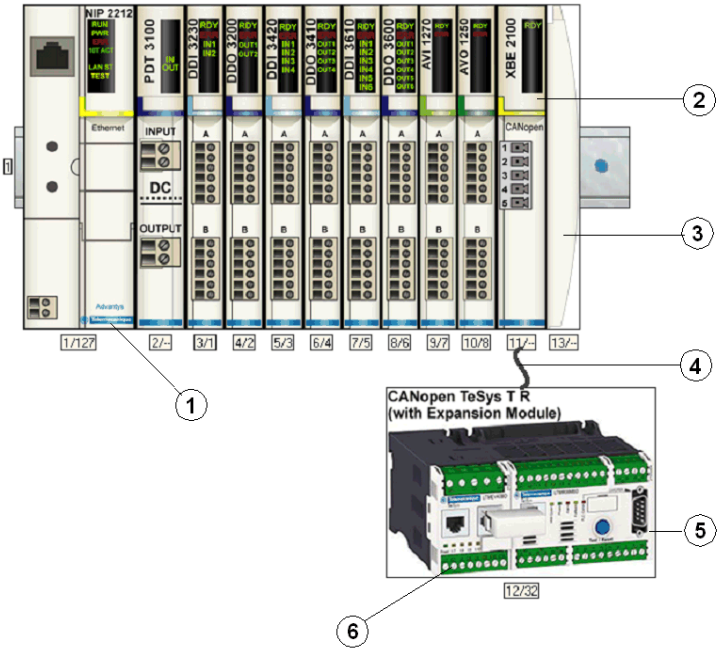
Prior to using the Advantys STB Software (ACS) to configure the TeSys T R (with Expansion Module) on an STB island you need to set the baud rate and node ID address as well as all warning and fault parameter levels. You do this with the PowerSuite configuration software-refer to the *PowerSuite Instruction Sheet* (1494182).

NOTE: The set-up for performing the baud rate and the node ID procedures are defined in the *TeSys T User Manual* (1639503).

NOTE: Remote configuration mode is the default mode of operation. You must use PowerSuite to set the mode to Local. It is not possible to set any parameters for the MMC with the ACS.

Connecting to the STB Island

The TeSys T R (with Expansion Module) requires an STB XBE 2100 CANopen extension module and STB XMP 1100 termination plate to be installed in the last two slots on the STB island that is to communicate with the controller. You use a CANopen extension cable to connect the TeSys T R to the extension module. An example of this type of setup is shown in the following figure.



1 Network Interface Module (NIM)
2 STB XBE 2100 CANopen extension module
3 STB XMP 1100 termination plate
4 CANopen extension cable (user supplied)
5 TeSys T R MMC
6 expansion module

NOTE: You can use any standard Advantys STB NIM *(see page 177)*to control the TeSys T MMC.

Configuring the STB Island

Next, you need to use the Advantys Configuration Software (ACS) to logically setup the TeSys T R and the Advantys STB island.

Step	Action
1	Start the ACS software.
2	Begin to configure the STB island (shown in the above figure) by dragging the modules from the hardware catalog on the right hand side of the screen.
3	Select a TeSys T R (with Expansion Module) from the Enhanced CANopen section of the hardware catalog browser.
4	An image of the TeSys T R (with Expansion Module) connected to the STB XBE CANopen extension module appears on the screen as shown in the above figure *(see page 283)*.
5	Click on **OK** to save the parameter settings and return to the main menu.
6	Build and download the island configuration to the NIM.

A variety of available Schneider Electric documents *(see page 254)* contain detailed descriptions of TeSys T components, wiring, LED patterns, functionality and set-up procedures.

CANopen TeSys T R (with Expansion Module) Data Process Image

Introduction

The output and input data process images for the TeSys T R (with expansion module) are described below.

NOTE: The following data format is particular to the island bus and ignores the fieldbus on which the island is operating. The data is transferred to the fieldbus master in a fieldbus-specific format. For fieldbus-specific descriptions, refer to one of the *Advantys STB Network Interface Module Application Guides*. Separate guides are available for each supported fieldbus.

For more information about each data word in the process image, consult the *TeSys T CANopen User Manual* (1639503).

Data Exchange Process

The following is an overview of data exchange between the fieldbus master and the Advantys STB NIM while the TeSys T R (with expansion module) is operating.

Stage	Description
1	The fieldbus master sends 7 words (output data process image) to the MMC: • control of the system (that is, run forward, run reverse) • Control of Analog Output 1 (reserved for future user) • output control of Boolean Outputs • PKW request object for PKW service (2 words) • PKW request data for PKW service (2 words)
2	The MMC then sends 8 words (input data process image) to the fieldbus master. • Status Register 1 (that is, ready, tripped) • Status Register 2 (that is, HMI port comm. loss) • logic input status (that is, Input status 1) • logic output status (that is, Output status 1) • PKW response object for PKW service (2 words) • PKW response data for PKW service (2 words)

NOTE: The process images are the same for STB islands containing TeSys T MMCs with or without an expansion module. In order to receive input data from the expansion module, PKW objects must be used. For details on PKW objects, refer to the *Advantys Configuration Software Help files*.

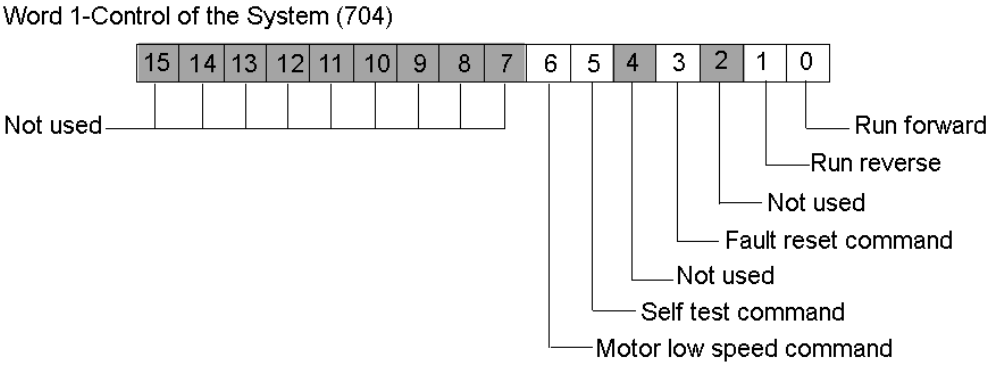
Output Data Process Image

The NIM keeps a record of output data in 1 block of registers in the process image. Information in the output data block is written to the NIM by the fieldbus master or by the Advantys configuration software when online and in the Test mode.

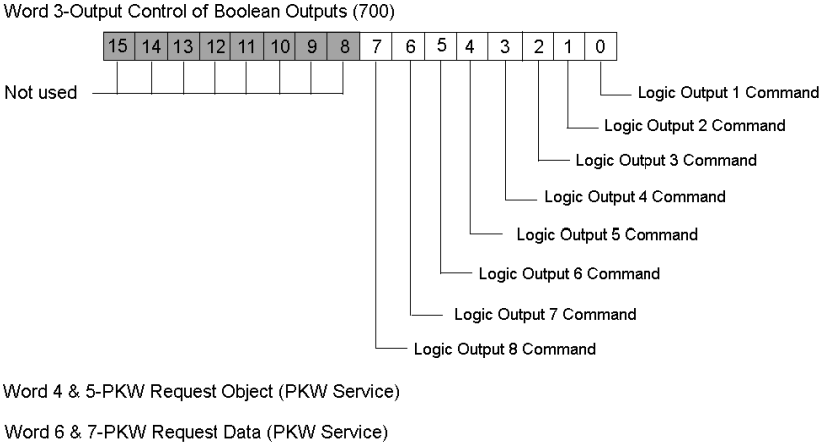
The NIM's output data process image is a reserved block of 4096 16-bit registers (in the range 40001 through 44096) that represents the data sent by the fieldbus master. Each output module on the island bus is represented in this data block. The CANopen TeSys T R (with expansion module) uses 7 contiguous registers in the output data block. Their specific positions in the process image are based on the module's node address on the island bus.

Representations of the output and data process image are shown below.

Output Process Image



Word 2-Control of Analog Output 1 (reserved for future use)


Word 3-Output Control of Boolean Outputs (700)
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Logic Output 1 Command
Logic Output 2 Command
Logic Output 3 Command
Logic Output 4 Command
Logic Output 5 Command
Logic Output 6 Command
Logic Output 7 Command
Logic Output 8 Command
Word 4 & 5-PKW Request Object (PKW Service)
Word 6 & 7-PKW Request Data (PKW Service)

Input Data Process Image

The TeSys T R (with expansion module) sends status data of the motor in control to the island's NIM. The NIM stores the information in 8 contiguous 16-bit registers.The input data process image can be read by:

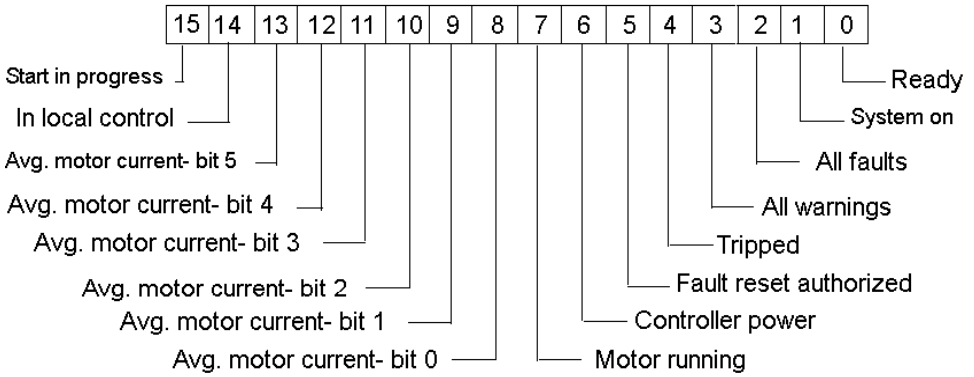
- the Fieldbus master
- an HMI panel connected to the NIMs CFG port
- the Advantys Configuration Software in the online mode

The NIM's input data process image, a reserved block of 4096 (16-bit) registers in the range 45392 to 49487 that represents the data returned the NIM. Each input module on the island bus is represented in this data block. Their specific positions in the process image are based on the module's node address on the island bus.

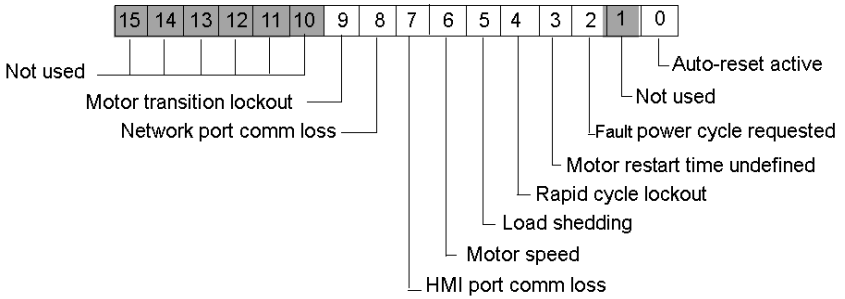
Representations of the input data process image are shown below.

Input Process Image

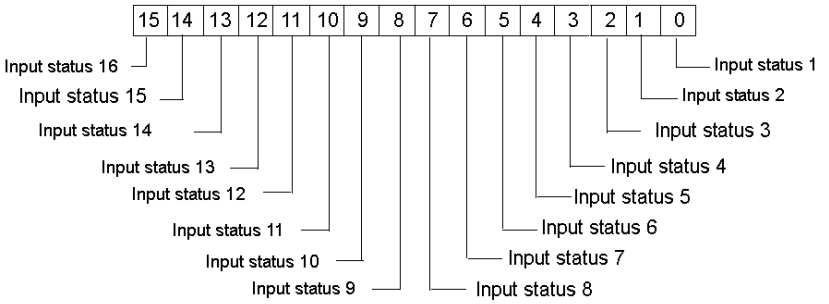
Word 1-Status Register 1(455)



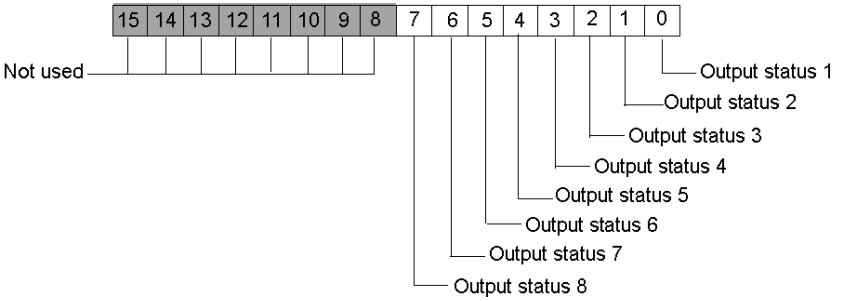
Word 2-Module Status Register 2(456)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Motor transition lockout
Network port comm loss
Auto-reset active
Not used
Fault power cycle requested
Motor restart time undefined
Rapid cycle lockout
Load shedding
Motor speed
HMI port comm loss

Word 3-Logic Input Status (457)



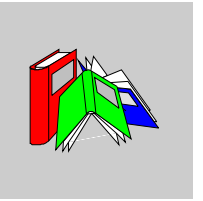
Word 4-Logic Output Status (458)


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Not used
Output status 1
Output status 2
Output status 3
Output status 4
Output status 5
Output status 6
Output status 7
Output status 8

Word 5 & 6-PKW Response Object (PKW Service)

Word 7 & 8-PKW Response Data (PKW Service)

Glossary



0-9

100Base-T

An adaptation of the IEEE 802.3u (Ethernet) standard, the 100Base-T standard uses twisted-pair wiring with a maximum segment length of 100 m (328 ft) and terminates with an RJ-45 connector. A 100Base-T network is a baseband network capable of transmitting data at a maximum speed of 100 Mbit/s. "Fast Ethernet" is another name for 100Base-T, because it is ten times faster than 10Base-T.

10Base-T

An adaptation of the IEEE 802.3 (Ethernet) standard, the 10Base-T standard uses twisted-pair wiring with a maximum segment length of 100 m (328 ft) and terminates with an RJ-45 connector. A 10Base-T network is a baseband network capable of transmitting data at a maximum speed of 10 Mbit/s.

802.3 frame

A frame format, specified in the IEEE 802.3 (Ethernet) standard, in which the header specifies the data packet length.

A

agent

1. SNMP – the SNMP application that runs on a network device.

2. Fipio – a slave device on a network.

analog input

A module that contains circuits that convert analog DC input signals to digital values that can be manipulated by the processor. By implication, these analog inputs are usually direct. That means a data table value directly reflects the analog signal value.

analog output

A module that contains circuits that transmit an analog DC signal proportional to a digital value input to the module from the processor. By implication, these analog outputs are usually direct. That means a data table value directly controls the analog signal value.

application object

In CAN-based networks, application objects represent device-specific functionality, such as the state of input or output data.

ARP

The ARP (address resolution protocol) is the IP network layer protocol, which uses ARP to map an IP address to a MAC (hardware) address.

auto baud

The automatic assignment and detection of a common baud rate as well as the ability of a device on a network to adapt to that rate.

auto-addressing

The assignment of an address to each Island bus I/O module and preferred device.

auto-configuration

The ability of Island modules to operate with predefined default parameters. A configuration of the Island bus based completely on the actual assembly of I/O modules.

B

basic I/O

Low-cost Advantys STB input/output modules that use a fixed set of operating parameters. A basic I/O module cannot be reconfigured with the Advantys Configuration Software and cannot be used in reflex actions.

basic network interface

A low-cost Advantys STB network interface module that supports up to 12 Advantys STB I/O modules. A basic NIM does not support the Advantys Configuration Software, reflex actions, nor the use of an HMI panel.

basic power distribution module

A low-cost Advantys STB PDM that distributes sensor power and actuator power over a single field power bus on the Island. The bus provides a maximum of 4 A total power. A basic PDM requires a 5 A fuse to protect the I/O.

BootP

BootP (bootstrap protocol) is an UDP/IP protocol that allows an internet node to obtain its IP parameters based on its MAC address.

BOS

BOS stands for beginning of segment. When more than 1 segment of I/O modules is used in an Island, an STB XBE 1200 or an STB XBE 1300 BOS module is installed in the first position in each extension segment. Its job is to carry Island bus communications to and generate logic power for the modules in the extension segment. Which BOS module must be selected depends on the module types that shall follow.

bus arbitrator

A master on a Fipio network.

C

CAN

The CAN (controller area network) protocol (ISO 11898) for serial bus networks is designed for the interconnection of smart devices (from multiple manufacturers) in smart systems for real-time industrial applications. CAN multi-master systems ensure high data integrity through the implementation of broadcast messaging and advanced error mechanisms. Originally developed for use in automobiles, CAN is now used in a variety of industrial automation control environments.

CANopen protocol

An open industry standard protocol used on the internal communication bus. The protocol allows the connection of any enhanced CANopen device to the Island bus.

CI

This abbreviation stands for command interface.

CiA

CiA (CAN in Automation) is a non-profit group of manufacturers and users dedicated to developing and supporting CAN-based higher layer protocols.

CIP

Common Industrial Protocol. Networks that include CIP in the application layer can communicate seamlessly with other CIP-based networks. For example, the implementation of CIP in the application layer of an Ethernet TCP/IP network creates an EtherNet/IP environment. Similarly, CIP in the application layer of a CAN network creates a DeviceNet environment. Devices on an EtherNet/IP network can therefore communicate with devices on a DeviceNet network via CIP bridges or routers.

COB

A COB (communication object) is a unit of transportation (a message) in a CAN-based network. Communication objects indicate a particular functionality in a device. They are specified in the CANopen communication profile.

configuration

The arrangement and interconnection of hardware components within a system and the hardware and software selections that determine the operating characteristics of the system.

CRC

cyclic redundancy check. Messages that implement this error checking mechanism have a CRC field that is calculated by the transmitter according to the message's content. Receiving nodes recalculate the field. Disagreement in the two codes indicates a difference between the transmitted message and the one received.

D

DDXML

Device Description eXtensible Markup Language

device name

A customer-driven, unique logical personal identifier for an Ethernet NIM. A device name (or *role name*) is created when you:

- combine the numeric rotary switch setting with the NIM (for example, STBNIP2212_010), or . . .
- edit the **Device Name** setting in the NIM's embedded web server pages

After the NIM is configured with a valid device name, the DHCP server uses it to identify the island at power up.

DeviceNet protocol

DeviceNet is a low-level, connection-based network that is based on CAN, a serial bus system without a defined application layer. DeviceNet, therefore, defines a layer for the industrial application of CAN.

DHCP

dynamic host configuration protocol. A TCP/IP protocol that allows a server to assign an IP address based on a device name (host name) to a network node.

differential input

A type of input design where two wires (+ and -) are run from each signal source to the data acquisition interface. The voltage between the input and the interface ground are measured by two high-impedance amplifiers, and the outputs from the two amplifiers are subtracted by a third amplifier to yield the difference between the + and - inputs. Voltage common to both wires is thereby removed. Differential design solves the problem of ground differences found in single-ended connections, and it also reduces the cross-channel noise problem.

digital I/O

An input or output that has an individual circuit connection at the module corresponding directly to a data table bit or word that stores the value of the signal at that I/O circuit. It allows the control logic to have discrete access to the I/O values.

DIN

Deutsche industrial norms. A German agency that sets engineering and dimensional standards and now has worldwide recognition.

Drivecom Profile

The Drivecom profile is part of CiA DSP 402 (profile), which defines the behavior of drives and motion control devices on CANopen networks.

E

economy segment

A special type of STB I/O segment created when an STB NCO 1113 economy CANopen NIM is used in the first location. In this implementation, the NIM acts as a simple gateway between the I/O modules in the segment and a CANopen master. Each I/O module in an economy segment acts as a independent node on the CANopen network. An economy segment cannot be extended to other STB I/O segments, preferred modules or enhanced CANopen devices.

EDS

electronic data sheet. The EDS is a standardized ASCII file that contains information about a network device's communications functionality and the contents of its object dictionary. The EDS also defines device-specific and manufacturer-specific objects.

EIA

Electronic Industries Association. An organization that establishes electrical/electronic and data communication standards.

EMC

electromagnetic compatibility. Devices that meet EMC requirements can operate within a system's expected electromagnetic limits without error.

EMI

electromagnetic interference. EMI can cause an interruption, malfunction, or disturbance in the performance of electronic equipment. It occurs when a source electronically transmits a signal that interferes with other equipment.

EOS

This abbreviation stands for end of segment. When more than 1 segment of I/O modules is used in an Island, an STB XBE 1000 or an STB XBE 1100 EOS module is installed in the last position in every segment that has an extension following it. The EOS module extends Island bus communications to the next segment. Which EOS module must be selected depends on the module types that shall follow.

Ethernet

A LAN cabling and signaling specification used to connect devices within a defined area, e.g., a building. Ethernet uses a bus or a star topology to connect different nodes on a network.

Ethernet II

A frame format in which the header specifies the packet type, Ethernet II is the default frame format for NIM communications.

EtherNet/IP

EtherNet/IP (the Ethernet Industrial Protocol) is especially suited to factory applications in which there is a need to control, configure, and monitor events within an industrial system. The ODVA-specified protocol runs CIP (the Common Industrial Protocol) on top of standard Internet protocols, like TCP/IP and UDP. It is an open local (communications) network that enables the interconnectivity of all levels of manufacturing operations from the plant's office to the sensors and actuators on its floor.

F

fallback state

A known state to which an Advantys STB I/O module can return in the event that its communication connection fails.

fallback value

The value that a device assumes during fallback. Typically, the fallback value is either configurable or the last stored value for the device.

FED_P

Fipio extended device profile. On a Fipio network, the standard device profile type for agents whose data length is more than 8 words and equal to or less than 32 words.

Fipio

Fieldbus Interface Protocol (FIP). An open fieldbus standard and protocol that conforms to the FIP/World FIP standard. Fipio is designed to provide low-level configuration, parameterization, data exchange, and diagnostic services.

Flash memory

Flash memory is nonvolatile memory that can be overwritten. It is stored on a special EEPROM that can be erased and reprogrammed.

FRD_P

Fipio reduced device profile. On a Fipio network, the standard device profile type for agents whose data length is two words or less.

FSD_P

Fipio standard device profile. On a Fipio network, the standard device profile type for agents whose data length is more than two words and equal to or less than 8 words.

full scale

The maximum level in a specific range—e.g., in an analog input circuit the maximum allowable voltage or current level is at full scale when any increase beyond that level is over-range.

function block

A function block performs a specific automation function, such as speed control. A function block comprises configuration data and a set of operating parameters.

function code

A function code is an instruction set commanding 1 or more slave devices at a specified address(es) to perform a type of action, e.g., read a set of data registers and respond with the content.

G

gateway

A program or hardware that passes data between networks.

global_ID

global_identifier. A 16-bit integer that uniquely identifies a device's location on a network. A global_ID is a symbolic address that is universally recognized by all other devices on the network.

GSD

generic slave data (file). A device description file, supplied by the device's manufacturer, that defines a device's functionality on a Profibus DP network.

H

HMI

human-machine interface. An operator interface, usually graphical, for industrial equipment.

hot swapping

Replacing a component with a like component while the system remains operational. When the replacement component is installed, it begins to function automatically.

HTTP

hypertext transfer protocol. The protocol that a web server and a client browser use to communicate with one another.

I

I/O base

A mounting device, designed to seat an Advantys STB I/O module, hang it on a DIN rail, and connect it to the Island bus. It provides the connection point where the module can receive either 24 VDC or 115/230 VAC from the input or output power bus distributed by a PDM.

I/O module

In a programmable controller system, an I/O module interfaces directly to the sensors and actuators of the machine/process. This module is the component that mounts in an I/O base and provides electrical connections between the controller and the field devices. Normal I/O module capacities are offered in a variety of signal levels and capacities.

I/O scanning

The continuous polling of the Advantys STB I/O modules performed by the COMS to collect data bits, status, error, and diagnostics information.

IEC

International Electrotechnical Commission Carrier. Founded in 1884 to focus on advancing the theory and practice of electrical, electronics, and computer engineering, and computer science. EN 61131-2 is the specification that deals with industrial automation equipment.

IEC type 1 input

Type 1 digital inputs support sensor signals from mechanical switching devices such as relay contacts and push buttons operating in normal environmental conditions.

IEC type 2 input

Type 2 digital inputs support sensor signals from solid state devices or mechanical contact switching devices such as relay contacts, push buttons (in normal or harsh environmental conditions), and 2- or 3-wire proximity switches.

IEC type 3 input

Type 3 digital inputs support sensor signals from mechanical switching devices such as relay contacts, push buttons (in normal-to-moderate environmental conditions), 3-wire proximity switches and 2-wire proximity switches that have:

- a voltage drop of no more than 8 V
- a minimum operating current capability less than or equal to 2.5 mA
- a maximum off-state current less than or equal to 1.5 mA

IEEE

Institute of Electrical and Electronics Engineers, Inc. The international standards and conformity assessment body for all fields of electrotechnology, including electricity and electronics.

industrial I/O

An Advantys STB I/O module designed at a moderate cost for typical continuous, high-duty-cycle applications. Modules of this type often feature standard IEC threshold ratings, usually providing user-configurable parameter options, on-board protection, good resolution, and field wiring options. They are designed to operate in moderate-to-high temperature ranges.

input filtering

The amount of time that a sensor must hold its signal on or off before the input module detects the change of state.

input polarity

An input channel's polarity determines when the input module sends a 1 and when it sends a 0 to the master controller. If the polarity is *normal*, an input channel will send a 1 to the controller when its field sensor turns on. If the polarity is *reverse*, an input channel will send a 0 to the controller when its field sensor turns on.

input response time

The time it takes for an input channel to receive a signal from the field sensor and put it on the Island bus.

INTERBUS protocol

The INTERBUS fieldbus protocol observes a master/slave network model with an active ring topology, having all devices integrated in a closed transmission path.

IOC object

Island operation control object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It is a 16-bit word that provides the fieldbus master with a mechanism for issuing reconfiguration and start requests.

IOS object

Island operation status object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It is a 16-bit word that reports the success of reconfiguration and start requests or records errors in the event that a request fails.

IP

internet protocol. That part of the TCP/IP protocol family that tracks the internet addresses of nodes, routes outgoing messages, and recognizes incoming messages.

IP Rating

Ingress Protection rating according to IEC 60529.

IP20 modules are protected against ingress and contact of objects larger than 12.5 mm. The module is not protected against harmful ingress of water.

IP67 modules are completely protected against ingress of dust and contact. Ingress of water in harmful quantity is not possible when the enclosure is immersed in water up to 1 m.

L

LAN

local area network. A short-distance data communications network.

light industrial I/O

An Advantys STB I/O module designed at a low cost for less rigorous (e.g., intermittent, low-duty-cycle) operating environments. Modules of this type operate in lower temperature ranges with lower qualification and agency requirements and limited on-board protection; they usually have limited or no user-configuration options.

linearity

A measure of how closely a characteristic follows a straight-line function.

LSB

least significant bit, least significant byte. The part of a number, address, or field that is written as the rightmost single value in conventional hexadecimal or binary notation.

M

MAC address

media access control address. A 48-bit number, unique on a network, that is programmed into each network card or device when it is manufactured.

mandatory module

When an Advantys STB I/O module is configured to be mandatory, it must be present and healthy in the Island configuration for the Island to be operational. If a mandatory module fails or is removed from its location on the Island bus, the Island will go into a pre-operational state. By default, all I/O modules are not mandatory. You must use the Advantys Configuration Software to set this parameter.

master/slave model

The direction of control in a network that implements the master/slave model is always from the master to the slave devices.

Modbus

Modbus is an application layer messaging protocol. Modbus provides client and server communications between devices connected on different types of buses or networks. Modbus offers many services specified by function codes.

MOV

metal oxide varistor. A 2-electrode semiconductor device with a voltage-dependant nonlinear resistance that drops markedly as the applied voltage is increased. It is used to suppress transient voltage surges.

MSB

most significant bit, most significant byte. The part of a number, address, or field that is written as the leftmost single value in conventional hexadecimal or binary notation.

N

N.C. contact

normally closed contact. A relay contact pair that is closed when the relay coil is de-energized and open when the coil is energized.

N.O. contact

normally open contact. A relay contact pair that is open when the relay coil is de-energized and closed when the coil is energized.

NEMA

National Electrical Manufacturers Association

network cycle time

The time that a master requires to complete a single scan of all of the configured I/O modules on a network device; typically expressed in microseconds.

NIM

network interface module. This module is the interface between an Island bus and the fieldbus network of which the Island is a part. A NIM enables all the I/O on the Island to be treated as a single node on the fieldbus. The NIM also provides 5 V of logic power to the Advantys STB I/O modules in the same segment as the NIM.

NMT

network management. NMT protocols provide services for network initialization, error control, and device status control.

O

object dictionary

Part of the CANopen device model that provides a map to the internal structure of CANopen devices (according to CANopen profile DS-401). A device's object dictionary (also called the *object directory*) is a lookup table that describes the data types, communications objects, and application objects the device uses. By accessing a particular device's object dictionary through the CANopen fieldbus, you can predict its network behavior and build a distributed application.

ODVA

Open Devicenet Vendors Association. The ODVA supports the family of network technologies that are built on the Common Industrial Protocol (EtherNet/IP, DeviceNet, and CompoNet).

open industrial communication network

A distributed communication network for industrial environments based on open standards (EN 50235, EN50254, and EN50170, and others) that allows the exchange of data between devices from different manufacturers.

output filtering

The amount that it takes an output channel to send change-of-state information to an actuator after the output module has received updated data from the NIM.

output polarity

An output channel's polarity determines when the output module turns its field actuator on and when it turns the actuator off. If the polarity is *normal*, an output channel will turn its actuator on when the master controller sends it a 1. If the polarity is *reverse*, an output channel will turn its actuator on when the master controller sends it a 0.

output response time

The time it takes for an output module to take an output signal from the Island bus and send it to its field actuator.

P

parameterize

To supply the required value for an attribute of a device at run-time.

PDM

power distribution module. A module that distributes either AC or DC field power to a cluster of I/O modules directly to its right on the Island bus. A PDM delivers field power to the input modules and the output modules. It is important that all the I/O clustered directly to the right of a PDM be in the same voltage group—either 24 VDC, 115 VAC, or 230 VAC.

PDO

process data object. In CAN-based networks, PDOs are transmitted as unconfirmed broadcast messages or sent from a producer device to a consumer device. The transmit PDO from the producer device has a specific identifier that corresponds to the receive PDO of the consumer devices.

PE

protective earth. A return line across the bus for fault currents generated at a sensor or actuator device in the control system.

peer-to-peer communications

In peer-to-peer communications, there is no master/slave or client/server relationship. Messages are exchanged between entities of comparable or equivalent levels of functionality, without having to go through a third party (like a master device).

PLC

programmable logic controller. The PLC is the brain of an industrial manufacturing process. It automates a process as opposed to relay control systems. PLCs are computers suited to survive the harsh conditions of the industrial environment.

PowerSuite Software

PowerSuite Software is a tool for configuring and monitoring control devices for electric motors, including ATV31, ATV71, and TeSys U.

preferred module

An I/O module that functions as an auto-addressable device on an Advantys STB Island but is not in the same form factor as a standard Advantys STB I/O module and therefore does not fit in an I/O base. A preferred device connects to the Island bus via an EOS module and a length of a preferred module extension cable. It can be extended to another preferred module or back into a BOS module. If it is the last device on the Island, it must be terminated with a 120 Ω terminator.

premium network interface

A premium NIM has advanced features over a standard or basic NIM.

prioritization

An optional feature on a standard NIM that allows you to selectively identify digital input modules to be scanned more frequently during a the NIM's logic scan.

process I/O

An Advantys STB I/O module designed for operation at extended temperature ranges in conformance with IEC type 2 thresholds. Modules of this type often feature high levels of on-board diagnostics, high resolution, user-configurable parameter options, and higher levels of agency approval.

process image

A part of the NIM firmware that serves as a real-time data area for the data exchange process. The process image includes an input buffer that contains current data and status information from the Island bus and an output buffer that contains the current outputs for the Island bus, from the fieldbus master.

producer/consumer model

In networks that observe the producer/consumer model, data packets are identified according to their data content rather than by their node address. All nodes *listen* on the network and consume those data packets that have appropriate identifiers.

Profibus DP

Profibus Decentralized Peripheral. An open bus system that uses an electrical network based on a shielded 2-wire line or an optical network based on a fiber-optic cable. DP transmission allows for high-speed, cyclic exchange of data between the controller CPU and the distributed I/O devices.

R

reflex action

A simple, logical command function configured locally on an Island bus I/O module. Reflex actions are executed by Island bus modules on data from various Island locations, like input and output modules or the NIM. Examples of reflex actions include compare and copy operations.

repeater

An interconnection device that extends the permissible length of a bus.

reverse polarity protection

Use of a diode in a circuit to protect against damage and unintended operation in the event that the polarity of the applied power is accidentally reversed.

rms

root mean square. The effective value of an alternating current, corresponding to the DC value that produces the same heating effect. The rms value is computed as the square root of the average of the squares of the instantaneous amplitude for 1 complete cycle. For a sine wave, the rms value is 0.707 times the peak value.

role name

A customer-driven, unique logical personal identifier for an Ethernet NIM. A role name (or *device name*) is created when you:

- combine the numeric rotary switch setting with the NIM (for example, STBNIP2212_010), or . . .
- edit the **Device Name** setting in the NIM's embedded web server pages

After the NIM is configured with a valid role name, the DHCP server uses it to identify the island at power up.

RTD

resistive temperature detect. An RTD device is a temperature transducer composed of conductive wire elements typically made of platinum, nickel, copper, or nickel-iron. An RTD device provides a variable resistance across a specified temperature range.

RTP

run-time parameters. RTP lets you monitor and modify selected I/O parameters and Island bus status registers of the NIM while the Advantys STB Island is running. The RTP feature uses 5 reserved output words in the NIM's process image (the RTP request block) to send requests, and 4 reserved input words in the NIM's process image (the RTP response block) to receive responses. Available only in standard NIMs running firmware version 2.0 or higher.

Rx

reception. For example, in a CAN-based network, a PDO is described as an RxPDO of the device that receives it.

S

SAP

service access point. The point at which the services of 1 communications layer, as defined by the ISO OSI reference model, is made available to the next layer.

SCADA

supervisory control and data acquisition. Typically accomplished in industrial settings by means of microcomputers.

SDO

service data object. In CAN-based networks, SDO messages are used by the fieldbus master to access (read/write) the object directories of network nodes.

segment

A group of interconnected I/O and power modules on an Island bus. An Island must have at least 1 segment and, depending on the type of NIM used, may have as many as 7 segments. The first (leftmost) module in a segment needs to provide logic power and Island bus communications to the I/O modules on its right. In the primary or basic segment, that function is filled by a NIM. In an extension segment, that function is filled by an STB XBE 1200 or an STB XBE 1300 BOS module.

SELV

safety extra low voltage. A secondary circuit designed and protected so that the voltage between any 2 accessible parts (or between 1 accessible part and the PE terminal for Class 1 equipment) does not exceed a specified value under normal conditions or under single-fault conditions.

SIM

subscriber identification module. Originally intended for authenticating users of mobile communications, SIMs now have multiple applications. In Advantys STB, configuration data created or modified with the Advantys Configuration Software can be stored on a SIM and then written to the NIM's Flash memory.

single-ended inputs

An analog input design technique whereby a wire from each signal source is connected to the data acquisition interface, and the difference between the signal and ground is measured. For the success of this design technique, 2 conditions are imperative: the signal source must be grounded, and the signal ground and data acquisition interface ground (the PDM lead) must have the same potential.

sink load

An output that, when turned on, receives DC current from its load.

size 1 base

A mounting device, designed to seat an STB module, hang it on a DIN rail, and connect it to the Island bus. It is 13.9 mm (0.55 in.) wide and 128.25 mm (5.05 in.) high.

size 2 base

A mounting device, designed to seat an STB module, hang it on a DIN rail, and connect it to the Island bus. It is 18.4 mm (0.73 in.) wide and 128.25 mm (5.05 in.) high.

size 3 base

A mounting device, designed to seat an STB module, hang it on a DIN rail, and connect it to the Island bus. It is 28.1 mm (1.11 in.) wide and 128.25 mm (5.05 in.) high.

slice I/O

An I/O module design that combines a small number of channels (usually between 2 and 6) in a small package. The idea is to allow a system developer to purchase just the right amount of I/O and to be able to distribute it around the machine in an efficient, mechatronics way.

SM_MPS

state management_message periodic services. The applications and network management services used for process control, data exchange, error reporting, and device status notification on a Fipio network.

SNMP

simple network management protocol. The UDP/IP standard protocol used to manage nodes on an IP network.

snubber

A circuit generally used to suppress inductive loads—it consists of a resistor in series with a capacitor (in the case of an RC snubber) and/or a metal-oxide varistor placed across the AC load.

source load

A load with a current directed into its input; must be driven by a current source.

standard I/O

Any of a subset of Advantys STB input/output modules designed at a moderate cost to operate with user-configurable parameters. A standard I/O module may be reconfigured with the Advantys Configuration Software and, in most cases, may be used in reflex actions.

standard network interface

An Advantys STB network interface module designed at moderate cost to support the configuration capabilities, multi-segment design and throughput capacity suitable for most standard applications on the Island bus. An Island run by a standard NIM can support up to 32 addressable Advantys STB and/or preferred I/O modules, up to 12 of which may be standard CANopen devices.

standard power distribution module

An Advantys STB module that distributes sensor power to the input modules and actuator power to the output modules over two separate power buses on the Island. The bus provides a maximum of 4 A to the input modules and 8 A to the output modules. A standard PDM requires a 5 A fuse to protect the input modules and an 8 A fuse to protect the outputs.

STD_P

standard profile. On a Fipio network, a standard profile is a fixed set of configuration and operating parameters for an agent device, based on the number of modules that the device contains and the device's total data length. There are 3 types of standard profiles: Fipio reduced device profile (FRD_P), Fipio standard device profile (FSD_P), and the Fipio extended device profile (FED_P).

stepper motor

A specialized DC motor that allows discrete positioning without feedback.

subnet

A part of a network that shares a network address with the other parts of a network. A subnet may be physically and/or logically independent of the rest of the network. A part of an internet address called a subnet number, which is ignored in IP routing, distinguishes the subnet.

surge suppression

The process of absorbing and clipping voltage transients on an incoming AC line or control circuit. Metal-oxide varistors and specially designed RC networks are frequently used as surge suppression mechanisms.

T

TC

thermocouple. A TC device is a bimetallic temperature transducer that provides a temperature value by measuring the voltage differential caused by joining together two different metals at different temperatures.

TCP

transmission control protocol. A connection-oriented transport layer protocol that provides reliable full-duplex data transmission. TCP is part of the TCP/IP suite of protocols.

telegram

A data packet used in serial communication.

TFE

transparent factory Ethernet. Schneider Electric's open automation framework based on TCP/IP.

Tx

transmission. For example, in a CAN-based network, a PDO is described as a TxPDO of the device that transmits it.

U

UDP

user datagram protocol. A connectionless mode protocol in which messages are delivered in a datagram to a destination computer. The UDP protocol is typically bundled with the Internet Protocol (UPD/IP).

V

varistor

A 2-electrode semiconductor device with a voltage-dependant nonlinear resistance that drops markedly as the applied voltage is increased. It is used to suppress transient voltage surges.

voltage group

A grouping of Advantys STB I/O modules, all with the same voltage requirement, installed directly to the right of the appropriate power distribution module (PDM) and separated from modules with different voltage requirements. Never mix modules with different voltage requirements in the same voltage group.

VPCR object

virtual placeholder configuration read object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It provides a 32-bit subindex that represents the actual module configuration used in a physical Island.

VPCW object

virtual placeholder configuration write object. A special object that appears in the CANopen object dictionary when the remote virtual placeholder option is enabled in a CANopen NIM. It provides a 32-bit subindex where the fieldbus master can write a module reconfiguration. After the fieldbus writes to the VPCW subindex, it can issue a reconfiguration request to the NIM that begins the remote virtual placeholder operation.

W

watchdog timer

A timer that monitors a cyclical process and is cleared at the conclusion of each cycle. If the watchdog runs past its programmed time period, it generates a fault.

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